

# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Boston, Mass., and additional mailing offices

© 1975 by Computerworld, Inc.

year

March 5, 1975

Vol. IX, No. 10



CW Photo by V. Farmer

Computerworld launched its 1975 Computer Caravan in Atlanta last week with minicomputer, communications and terminal companies, among others, demonstrating their equipment. This week the Caravan is in Philadelphia. Coverage on the Atlanta Caravan continues on Pages 4, 5 and 6.

## Needed Less Complexity

By Patrick Ward

Of the CW Staff

ATLANTA — After a three-month trial period with an alternative data base management system (IDMS), Southern Railway's way systems has decided to scrap its IBM IMS package, according to Dr. William E. Lim, the data base project advisor for the carrier.

Less complexity and greater ease of use were the chief advantages which led railroads to choose Calidata's 3210 IDMS data base management system, he told a Computer Caravan session here last week. Southern tried IMS in a pilot program a year ago, but will soon permanently shift the DBMS function to IDMS and the scheduling function to a communications module.

Southern's programmers agreed IDMS is much easier to use than IMS, Lim said. Data base design also proved easier, he commented, and programmer productivity jumped.

In addition, IDMS has a network organization which gives it more flexibility than the hierarchical organization of IMS.

he said. Lim noted it requires much less disk space.

Conversion of IDMS to the railway's present system took only about three weeks, Lim said, adding "we expect to phase in IDMS to replace our own software soon."

The shop also plans to use a communications monitor to replace IMS in handling the scheduling function, since IMS was found to be uneconomical for that

use alone, Lim said.

When the railway company first developed its car scheduling system several years ago, it kept track of railway cars, it relied on in-house programming, according to the project advisor.

Describing Southerlin's system, Lim noted customers currently use teletype-writers to inquire where individual cars or fleets of cars are. The railroad's staff uses

(Continued on Page 4)

## Railway Dumps IBM Data Base System

he said. Lim noted it requires much less disk space.

Conversion of IDMS to the railway's present system took only about three weeks, Lim said, adding "we expect to phase in IDMS to replace our own software soon."

The shop also plans to use a communications monitor to replace IMS in handling the scheduling function, since IMS was found to be uneconomical for that

use alone, Lim said.

When the railway company first developed its car scheduling system several years ago, it kept track of railway cars, it relied on in-house programming, according to the project advisor.

Describing Southerlin's system, Lim

noted customers currently use teletype-writers to inquire where individual cars or fleets of cars are. The railroad's staff uses

(Continued on Page 6)

## DP Too Young for Licensing, ICCP Officer Says

By E. Drake Lundell Jr.

Of the CW Staff

ATLANTA Data processing is "an emerging profession of best," making any proposals to license practitioners in the field "premature," Fred Harris, vice-president of the Institute for the Certification of Computer Professionals (ICCP), told Computer Caravan attendees here last week.

Data processing today meets few of the criteria sociologists have established to

define a profession, Harris noted, adding that professionals should be oriented toward community interest and have both specialized and general knowledge, a high degree of self-control over behavior and a system of rewards for service.

DP does not yet have an established educational program that is accepted worldwide, the American development has been very limited, he noted.

At the same time, the only existing examination to certify people in the business is "not widely respected by the industry and public alike," he added.

Further, the only existing ethical code exists in business, and the enforcement procedures for those codes are either nonexistent or unused, he said.

"For these reasons, DP is not recognized as a professional group," Harris said.

### Distinction Must Be Made

Harris said a distinction has to be made between certification and licensing, pointing out certification is a voluntary program operating within a peer group, while licensing is a government action that can be imposed for a variety of reasons, such as a method of limiting the work force.

"One would hope," however, that a strong, well-run certification program could be used as a prerequisite to any licensing developed in the future, Harris added.

He said for this to happen, a great deal of work needs to be done, he said, to establish the tests required for certification.

In this area, the ICCP is working to revise the Certificate in Data Processing (CDP) program to increase its credibility.

The institute will be working with professional testing organizations to get advice

## • At CW Caravan

By Patrick Ward

Of the CW Staff

## • At Compcon

By Molly Upton

Of the CW Staff

SAN FRANCISCO Computer professionals can expect to play a dual role in assuring a society that respects individual rights to privacy, Dr. Walter W. Ware of the Rail Computer interests at the 10th Annual Computer Society International Conference (Compcon) here last week.

"We must be involved to provide sound technological input" to legislative efforts attempting to deal with individual rights to privacy, he stressed, in addition to the task of assuring a technically secure system.

"Not one of us can walk away from social issues," Ware said in the address that keynoteed the conference, whose theme was "Computer Technology to Read the People."

"It is important for us to assist in the creation of good legislation and see to it the intent of privacy is served," he said. Basically, that intent is to preserve the individual against harm and give him legal redress.

Appropriate privacy safeguards, Ware explained, are part of the balance that must be struck between computers and people and between technology and society.

Computer professionals should see to it that any DP-related innovations which dramatically affect the public are de-

(Continued on Page 2)

## UK User Group Grieves to EEC On Proposed IBM Price Hikes

By Edith Holmes

Of the CW Staff

LONDON — After a proposed IBM price increase of up to 20 percent in maintenance costs, the IBM Computer Users' Association here has filed a complaint with the Common Market in Brussels.

Acting on behalf of some 500 member companies in the association, the group is asking the European Economic Community (EEC) commission to investigate the price increase in connection with the commission's current antitrust probe into IBM's European activities. Frank Hooper, chairman of the IBM Computer User Association in the UK, protesting the price boost and informing him of the complaint to the EEC commission.

He noted the user group has also appealed to the EEC Price Commission about the increase, proposed last November and scheduled to take effect May 1, but that body has ruled in favor of the IBM

action. And with this ruling, "we are given no legal redress with which to appeal," Hooper told CW.

While the association does not oppose every increase, Hooper contended there are "certain areas where price rises are onerous and unfair." The proposed 20% increase in maintenance costs, even on some 10-year-old systems, he said, is as extreme as a 2540 card reader/punch and the 1403 line printer, serves as an example, he said.

The UK user group is somewhat suspicious of a price increase dependent on changing the maintenance component of rental costs, Hooper noted.

He noted the association had also written to Edward Nixon, chairman of IBM in the UK, protesting the price boost and informing him of the complaint to the EEC commission.

IBM has acknowledged our com-

plaint. And with this ruling, "we are given no legal redress with which to appeal," Hooper told CW.

While the association does not oppose every increase, Hooper contended there are "certain areas where price rises are onerous and unfair." The proposed 20% increase in maintenance costs, even on some 10-year-old systems, he said, is as extreme as a 2540 card reader/punch and the 1403 line printer, serves as an example, he said.

The UK user group is somewhat suspicious of a price increase dependent on changing the maintenance component of rental costs, Hooper noted.

He noted the association had also written to Edward Nixon, chairman of IBM in the UK, protesting the price boost and informing him of the complaint to the EEC commission.

IBM has acknowledged our com-

(Continued on Page 2)

on the structure of the program, he said. Future needs will require different exams for different levels in the business, Harris said, from entry-level testing to self-assessment and recertification for practitioners in the field.

In addition, there is a need to link a future certification examination process, he commented, so people can be tested differently depending on their various functions or industry specialties.

A curricula should be developed that divides the body of knowledge in the field into modules, he said, so that a certification program could be developed along those lines with modular testing.

But no testing alone can determine whether DP will become a profession, Harris indicated.

DP "will be going to be the ones who will be going to become a profession," Harris said. As it becomes a profession, the user group will take commitment on the part of all in the business, he added.



CW Photo by V. Farmer

Fred Harris

**COMPUTERWORLD**  
THE NEWSLETTER FOR THE COMPUTER COMMUNITY  
1000 U.S. Per Min

## EDITORIAL

Editorial News/  
Technical News

E. Drake Lundell Jr.

Associate Editor/  
Hardware

Ronald A. Frank

Associate Editor/  
Software

Victor J. Farmer

Computer Industry  
Editor

Donald Lewitt

## Staff Writers

Molly Upton

## Chief Copy Editor

Nancy French

## Copy Editors

Edith Holmes

## Editorial Assistants

Patrick G. Ward

## Contributor

Tom Wissman

## Business:

Molly Upton

## West Coast

Cheryl M. Gott

## Europe

John P. Hebert

## Asia

Kathleen Quinn

## Contributors:

Catherine Arast

## Education

Ann Dooley

Taylor Report/Pro  
fessional Practices

J. Daniel Couger

Vice-President/  
Editorial Services

Alan Taylor

## SALES

Edward J. Bride

Vice-President/  
Marketing

T. Neal Wilder

## Sales Administrator

Dorothy Travis

## Traffic Manager

Judy Millford

## Classified Advertising

Sara Stets

## Market Research

Kathryn V. Dinneen

## CIRCULATION

Margaret Phelan

Vice-President/  
Circulation

Barbara Jeannetti

## Assistant Manager

## PRODUCTION

Leete Daily

## Manager

Henry Fling

## Supervisor

## Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone (617) 955-8800. Telex: 92-5259.

## OTHER EDITORIAL OFFICES: Los Angeles, (213) 665-6008; England: Computerworld, c/o EC Europe Ltd., 140-146 Camden Street, London NW1 7EP; Germany: Computerworld, Computerwelt GmbH, 18, München 40, Trinitatstrasse 11. Phone: 36-40-36-37. Tel: 5215350. Asia: Computerworld, Computer News, 1-11-15, Higashi Gion, Toda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 45-6101. Japan: Computerworld, 1-1-1, Chuo-cho, Shinagawa-ku, Tokyo 141. Phone: (03) 45-6101. Second-class postage paid at Boston, Mass., and additional mailing offices. Postmaster: Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. All other foreign, \$12 a year. Four weeks notice required for change of address.

## Registration of material appearing in Computerworld is strictly forbidden without written permission. Send all requests to Walter Boyd.

## Computerworld can be purchased on 35mm microfilm in half-volumes (six-month periodicals) and on microfiche (one-month periodicals). Order from: 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700.

## COMPUTERWORLD, INC.

President/Publisher

Patrick J. McGovern

## Executive Vice-President

W. Walter Boyd

## Vice-Presidents

Edward J. Bride

## Editorial Director

Margaret Phelan

## Editorial Director

T. Neal Wilder

## Editorial Director

Dr. H.R.J. Gorsch



YABP AIA

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Massachusetts 02160.

## Play Dual Role, Compcon Told

(Continued from Page 1)

signed to give consideration to the effects of its involvement.

But involvement might also be motivated by the desire to preserve or implement workable systems. "It is clear that laws can have horrendous consequences," said Ware, who observed that legislation often ends up miles away from its original intent and proves difficult to implement, he said.

## Private Sector Law "Irreversible"

The need for privacy legislation is clearly mounting and will probably result in a federal law affecting private business within two or three years, Ware said.

"I think it's inevitable," although the abuse of personal information in private industry is not nearly as evident as it is within government, he said.

More than this year there are no less than 27 state bills on some aspect of privacy, he said, most of them involving DP. Ware painted the specter of corporations attempting to deal with 50 different state laws on the subject. "It's a mess of information," he said. "There would be a continuous series of retrofits; software stability would become a thing of the past," he said.

But his audience's amused reaction indicated software stability may not have yet.

All individual must have some control over the use of his information and there must be some legal basis governing the use by others of certain personal information, Ware contend.

If there are no controls, each individual will be at the mercy of organizations that will regard the information as their property, he cautioned.

## UK IBM Users Protest Price Hikes

(Continued from Page 1)

responsidence, which is all we expected," Hooper added.

## IBM Standing Firm

Meanwhile, IBM is standing firm behind its proposed price increase. "We would stress that we consider the increases which have been announced are justified, reflecting as they do the severe cost inflation the company has been facing for some time," said a spokesman said in response to the user association's complaint to the EEC.

"We have made our statement and plan no further action once the 20% increase is put in place," Hooper said, adding that the association "is not looking for a head-on collision or a public shaming of IBM with this price increase."

He stressed, however, that member users believe this pricing policy should be closely examined as part of the overall

## Telex Files for Rehearing

TULSA, Okla. — Telex Corp. has filed a petition for a rehearing of its antitrust suit against IBM with the U.S. Court of Appeals for the 10th Circuit at Denver.

After the court of appeals denied a petition to define the relevant product market, the petition asked a review of the case by the full court.

The appeals court judgment, reversing a trial court finding that IBM had violated the Sherman Antitrust Act, was handed down by a three-judge panel on Jan. 24 (CW, Feb. 5).

In addition to defining the relevant product market, the Telex petition contained the appellate opinion contained "substantial errors resulting in a gross miscarriage of justice."

The company said its petition stated

one major error was the court's holding "that IBM marketing strategies, pricing and other actions in the marketplace were proper competitive processes."

Telex also said its petition contained "detailed explanations of the errors of fact, misapplications of applicable law and inconsistencies in the decision."

The court of appeals "should be given the full court hearing would be granted by the appeals court and that the decision would be overturned after rehearing. It added, however, that if unsuccessful in either obtaining a rehearing or overturning the three-judge decision, Telex would seek a review by the U.S. Supreme Court.

"We remain convinced that the company's legal position is correct," Telex asserted, "and that we shall ultimately prevail."

## FPC Confirms Contract Officer Worked for Bid Winner's Firm

WASHINGTON, D.C. — A Federal Power Commission (FPC) official has confirmed that one of its contract officers who helped put together requirements for a \$10.4-million contract with a former agent of Planning Research Corp. (PRC) was employed by PRC for six years prior to accepting the FPC job.

George Brent Vivian, who also helped draft some of the technical components of the requirements for facilities management that could yield PRC up to \$10.4 million, was employed by PRC from 1965 to 1971.

In initiating the study, Moss questioned the propriety of permitting PRC to manage sensitive regulatory information such as availability, market, locations of clearing, walls and applications for rate hikes, for example, since PRC's subsidiary, Forster Associates, represents petrochemical interests in Washington.

Joseph DiMarino, assistant executive director of the FPC, confirmed Vivian had been with PRC for six years and Vivian had resigned himself from the program when it became apparent PRC would bid on the facilities management contract.

With Rep. Moss' accession to the chairmanship of the Investigations Subcommittee of the Interstate and Foreign Commerce Committee, some observers feel there is a possibility Moss might use his committee's jurisdiction to hold hearings on this contract and other FPC matters.

The subcommittee, acknowledged to be one of the most powerful investigative bodies in Congress, possesses legislative oversight authority over the entire federal regulatory agency structure, including the FPC.

## On the Inside This Week

## NEWS

The 'Tried and True' Dominate at Caravan Exhibits ..... 4  
Manpower Lacks Smil System Programming ..... 5  
Boston DP Center Helps Track Missing Students ..... 7  
Overpaid School Aide Sued in Paying Mix-Up ..... 12  
Tennis Ranking May Eliminate Cries of 'Foul' ..... 30

EDITORIAL ..... 30  
SOFTWARE & SERVICES ..... 13  
Proud Operations Staff Welcomes Aid ..... 13  
System Readiness Aids Inventory Control ..... 14  
User-Formatted Dumps Ease Debugging ..... 15

COMMUNICATIONS ..... 19  
Packet-Switched Net to Charge by Kilopacket ..... 19  
Terminal Management Vital for Success ..... 19

## TERMINAL TRANSACTIONS

Firm Scraps Teletypes, Cuts Processing Time ..... 20  
Adds Introduces MRD 980 CRT, TTY Replacement ..... 22

MINIWORLD ..... 22  
Firm Comes to Terms With 'Reality' ..... 23  
Road to Blocktop Profit Paved With Mini ..... 25

SYSTEMS & PERIPHERALS ..... 27  
Automated Tape Units Save Users' Cash ..... 27  
IBM Adds Magnetic Tape Option ..... 28

COMPUTER INDUSTRY ..... 33  
Will U.S. IBM Settle Before Court Date? ..... 33  
Service Strategy Helps DRI Customers Forecast ..... 34  
Oil Company Becomes Vendor of DP Training ..... 35

FINANCIAL ..... 46

Memorex Loses \$8.97 Million in '74 ..... 46  
Graham Six-Month Results Up 10% ..... 46

# Approach to Program Design More Vital Than Tools

By Molly Upton  
Of the CW Staff

**SAN FRANCISCO** - If you can't describe clearly how a program is going to be designed, don't reach for coding sheets for the answers!

That was the basic message of several speakers at Compcon '75/Spring, the IEEE Computer Society's international conference held here last week.

Both the opening keynote address and a session entitled "Obtaining Reliable Software" emphasized the methodology approach, rather than assessment of programming tools.

Keynoter William McKeeman, chairman of the international standards department at the University of Santa Cruz, stressed the need for using a natural language when outlining construction of a program.

In his address, "Preventing Programming Languages From Interfering With Programming," McKeeman urged programmers to use a multisystem, multilanguage approach and, above all, to document each stage.

Ralph E. Keirstead of the Stanford Research Institute agreed. In his presentation on software correctness during the technical session, he said one cannot expect one language or a group of languages to cover the spectrum of tasks to be performed.

While both men implored programmers to use a language they can easily think in, such as English, to clearly outline the way a program is to be constructed, Keirstead extended the range of languages to include an expanded program language.

Too much of the clerical work that should be done by compilers, is being done by programmers, he said.

McKeeman sketched various stages in

program creation, stressing orderly transitions.

Only after outlining the method of solution in an understandable language should the programmer embark on implementing the approach in a programming language, he said.

Documentation should be made at each stage so the logic behind further program refinements, such as refining loops, would be clear to those who later have to cope with the program, he said.

"We need cleverness, but make it understandable," he pleaded. "The whole program presentation should be readable, but there is no substitute for formal methodology when dealing with formal systems." McKeeman said.

Keirstead emphasized the need for avoiding the quantum jump created when one throws away intermediate programming efforts. He asked for a review during the process, which requires documentation.

"Postimplementation analysis is too

late," he warned. "It should come earlier."

Review will minimize the antagonism between overall performance and well-defined specifications, he said. In fact, both of these elements tend to "creep along together," thus blurring the antagonism that can occur between them.

be expanded.

The concept of measures of efficiency have been narrow, McKeeman said. Programmers currently tend to focus on execution time, but how about considering the whole process when people are involved?

Ed Miller of General Research, Inc. gave some dos and don'ts on writing testable code. General Research is involved in creating packages to analyze and test Fortran programs for reliability.

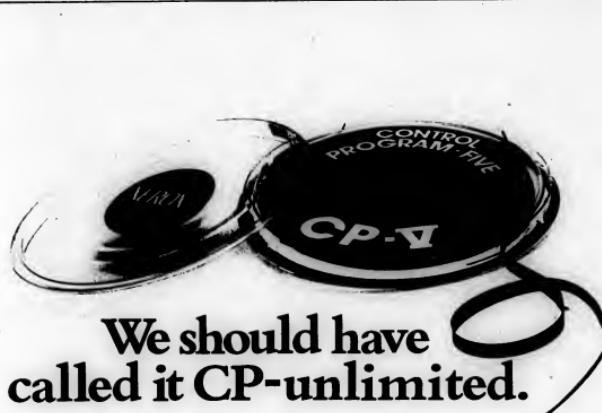
In his presentation on how to structure programs, his advice was to write clearly after thinking clearly. "Structured programming is really not a pile of crap, although it may sound that way if you listen to too many of the wrong people," he said.

Miller's don'ts, or impediments to testability, included: long reach sequences, function structure complexity, internal semantic opacity and block communication."

## CW At Compcon

And "the big battle at the end gets repaid by a number of skirmishes." It's better to lose a little along the way than to lose it all at the end, he observed.

Keirstead explained that in order to relieve programmers of tasks that could be left to compilers, he has developed what constitutes a declaration and the sense of what "executable" means should



## We should have called it CP-unlimited.

After all, it is the most advanced operating system around.

And it's already been proven. And tested. (As any of our customers will tell you.) Plus, CP-V does give you simultaneous access in five modes. Real Time. Time-sharing. Multi-programmed Batch. Remote Batch. Transaction Processing.

There is the additional fact that Control Program Five (CP-V) ties together Xerox Distributed Multi-user computer systems.

And that CP-V is a key reason why our approach to hardware and software really works. (We've combined a unique hardware interrupt structure with independent processors and multi-port memory.)

All of which means you can talk to your computer and have it talk back to you intelligently. When you want to.

Not to mention that linking up CP-V to your present computer system presents minimal conversion problems.

It means more computer accessibility for more people in your company. Which means a smarter company. Which could mean a more profitable company.

And you can find out about CP-V for your company by calling (213) 679-4511, ext. 950. Or drop us a line at Xerox Corporation, Dept. I 5-08, 701 S. Aviation Blvd., El Segundo, California 90245.

So why'd we merely call it CP-V instead of CP-Unlimited?

Modesty.

## Controversy Dying

By E. C. Weaver, writer

**SAN FRANCISCO** - The concept of programming regulations - on standards - seems to have lost much of the controversial status it had two years ago if the reactions of a large audience at the 10th IEEE Computer Society's international conference, Compcon '75/Spring, session on "Obtaining Reliable Software" are any indication.

Although the concept, endorsed by panelist Larry Weaver of the Institute of Advanced Computation, generated much active discussion, there seemed to be a general if tacit acceptance of the necessity for standards.

Two years ago, said Weaver, the idea of programming regulations would have elicited near-violent reaction, much of it centering on a widely felt need to let a programmer be creative rather than be restricted by standards. Comparing Programming with the effort involved in putting up a building, he asked, "Why are we so remote from achieving the same ease of construction?"

Carefully codified sets of standards and due process for changing code could do much to help avoid many pitfalls, he said.

Throughout construction of a building, he said, the implementation of plans are monitored, and the plan itself has to be reviewed.

Advantages of what he termed the "building code" approach are numerous, he said.

Inspection at each stage of completion prevents people from wandering off in wild directions, he said. A set of checked-out modules is encouraged, since they are better identified and documented and known to conform to code.

Training and evaluation of programmers, contract writing and cost estimation are placed on a more understandable and less individually biased basis, Weaver said.

**XEROX**

XEROX® is a trademark of XEROX CORPORATION.



NCR packed a lot of equipment into its booth, including its NCR 260 terminals and Quantor-supplied COM recorder.



It isn't a slot machine, but winners at the Control Data booth walked off with bonuses if they hit the right combination of slides.



Hewlett-Packard lined up its 2640 terminals and 21MX minicomputers.



Software AG made good use of a video tape recording to demonstrate how its Adaptable Data Base System (Adabas) functions.

## Caravan Told Privacy Costly

(Continued from Page 1)

sonal data inherent in the legislation." But the privacy safeguards could offset this savings through "reduced efficiencies" in automated systems, he said. Although the federal law is written for agents of the U.S. Government, it also affects federal contractors and states using grants of federal money, he said.

Beyond cost requirements, the prohibition on use of the Social Security number (SSN) as a unique identifier will perhaps cause some consternation to future systems designers, he predicted. It remains unclear whether user agencies will be able to apply for the right to use the SSN, he said. "If not, we must design our own standard identifiers."

Users will also have to install a sizable program to maintain a record of who accessed regulated files and when, he noted.

### DP: A Viable Management Resource

Despite these challenges, DP will continue to be a viable management resource in the future, O'Neal said.

Computer management should therefore ensure its DP operations are cost-effective and should never view the function "just as overhead," he stated.

State government simply could not operate efficiently without computers, he



Ernie O'Neal

said. The state of Georgia processes some 1.5 million tax returns and is currently doing them with a two-week turnaround time, O'Neal pointed out.

Computer systems are also the only effective way to deliver much information to police officers, he said, adding social services also heavily depend on DP today.

### Time for Expanded Commitment

This might even be the time for an expanded commitment to DP, since rising labor and other costs may have made it a more cost-effective approach to tasks and problems.

O'Neal urged attendees to be a part of their company's management team. "Get to know the nature of problems and present management across the company deals with," he said.

DP "is simply a tool or mechanism you can use to make management's job a lot easier," he said.

## The 'Tried and True' Dominate Exhibits

ATLANTA — Tried-and-true products predominated at the opening of the Computer Caravan here last week, with exhibits slanted heavily toward minicomputer, terminal/communications and software products.

While there were few introductions of new products, many exhibitors who showed products introduced over the past few years manifested a sophistication which enhanced the more varied demonstrations of main-line products.

One vendor with a new product in its pocket was Varian Associates, which showed its T-Scan 880, an RS-232C-interfaced card reader. The 880 reads a pencil-marked card and prints the marked data on the card by inputting the data to a computer.

The card is also print-coded during printing and can be reused. The second time it is used, however,



Computerworld Publisher Patrick J. McGovern kicks off the fourth annual CW Caravan.

### Photo Feature by Vic Farmer

the coded card is optically read so the information can be checked against the data base; the CPU, through the 880, can then print the card.

Read/print rate is about 5 seconds and the unit is priced at \$7,500 from the firm at 12063 Valley View St., Garden Grove, Calif. 92645.

Cook Engineering packaged a special 16-channel fallswitch switch \$2,100 for the first time at the show. The device allows a user to switch modems, terminals and ports to spares at the push of a button. The firm is located at 900 Slaters Lane, Alexandria, Va. 22314.

Modular Computer Systems (Modcomp)



Varian demonstrates its 880 card terminal.

demonstrated its Max IV software using virtual memory on its Modcomp IV minicomputer. General Automation showed its Data Management 100 system using the Max IV as the front end.

Other new products shown included Delta Data's 4000 terminal and the Sycom 340 with a floppy disk option.

Incoterm was showing its Incoform Forms Generation Package but indicated they were not ready to release the product generally yet.

Hewlett-Packard had its 4K-chip, 21 MX minis on hand as well as their 2640A terminals.

Lunch is followed with a keynote speech.

## Real Measure of DP Performance Lies in How Center Serves Users

ATLANTA. "Bits and bytes" are important in measuring the performance of a computer center, but DP managers should remember their primary function is to supply service to users within their corporation, predicted a Computer Caravan panelist here last week.

The real measure of the performance of a center is how well it serves the users of computer power, George Martin of Days Inns of America, Inc. and Dan Gladney of The Southern Co. said.

DP managers should not take the time to constantly perform the measurement function, Martin said, adding that they should, because other managers are "not always qualified" to judge performance in DP.

### 'Preventive Maintenance'

At the same time, performance measurement should be thought of as "preventive maintenance," Martin noted. It should be used in every phase of a system's life cycle, not just brought in when there is a problem.

To be successful, the performance measurement function needs to be centrally located and to communicate with management, application programmers, system personnel, vendors and the end user, Gladney commented.

The communications with the users of the system can be the most important element, he indicated, because they will be the first to notice a real degradation in system response time and availability.

Formal feedback from the users to this centralized coordinating committee is one of the best ways to monitor systems, he added. After that, monitors — both hardware and software — can be used to track down the source of problems.

This centralized coordinating committee, he said, should receive information on every error condition in the system, from the CPU down to a minor line problem in the communications system. The committee's function should be to isolate those problems and get the proper people involved in solving them.

At the same time, the coordinating group can keep top management informed of any system problems and, therefore, the need for new facilities or equipment, he added.

### Running Before the System

The coordinating group should be established and up and running before the implementation of any system, Martin indicated, and should be used to help define the system as it is meant by performing within the company.

In his firm, as an example, the company uses response time as the key to measuring the performance of a system, since its users are interacting with the public when they need the system.

However, he indicated other companies might have different problems that would lead them to choose other performance criteria for their systems.



# Railway Jilts IBM for Independent DBMS

(Continued from Page 1)

remote Univac DCT 1000 terminals and IBM 3277s at headquarters for its own inquiries into the system, he added.

Data entry is done at the central site through 101 Burroughs TC 500 terminals. The source documents are the waybills the railroad's agents fill out for customers. Agents transmit facsimiles of the waybills to Atlanta, both for the car movement system and for accounting systems.

Much of the railroad's volume is from customers who repeat the same types of shipments. In these cases, the data entry operator can just key in a repetitive waybill code plus the variable information, Linn said.

An IBM 360/50 acts as a front-end processor, logs the data onto tape and queues it on a direct-access device for an IBM 360/65 processor.

## Small Center Heads Can't Ignore Planning

ATLANTA Managers in a small DP center have a tendency to sit back and say, "We'll take care of today's work today, and next month's and next year's work will take care of itself," according to Austin States, DP manager at Cotton States Insurance Co.

But planning is as crucial for the small center manager as for anyone else, Austin told Computer Caravan attendees here last week.

For one thing, the small center manager has to deal with a personnel situation in which each member of his staff has to wear several hats, he said. But he must remember the shop's excellent operator may make a particular decision that the two join and different types of people.

It's also up to the DP manager to use some initiative and imagination to cut costs, Austin said. Cotton States' DP department, for example, has tried to redesign its forms so they cost less for us rather than us working for them."

Another suggestion is how to produce management reports for a number of different people in the company when the DP department's computer is relatively slow.

One solution is to run one report instead of six or seven if people in the company are seeking essentially similar information, he said.

Southern's original software for this system included a single-thread scheduler and a file handler which no two programs could reference on a reentrant basis. This software initially served quite well, but

system... and found we could gain 25% to 30% in throughput," Linn said. DBMS users usually expect to lose some throughput for greater flexibility, he noted.

## CW at Caravan

eventually became a bottleneck, Linn said.

The scheduler, for example, had to be revised as the shop added application systems. Approximately 30% to 50% of the application code was concerned with DBMS functions, Linn noted.

Three years ago, Southern began looking at commercialized DBMS as a solution. IBM provided both the data communications and data base facilities the applications required.

"We benchmarked IMS against our single-thread file handler and scheduler

The shop decided to implement IMS as a scheduler first. This phase was completed a year ago after an eight-month conversion process.

At this point, the Southern DP shop rewrote its file handler so it could be invoked by the number of users, Linn said, and improved 50%, he said.

IMS, the staff decided, would be too complex for them to rely upon to handle a critical application like the car movement/waybilling system. The railway then selected Cullinane Corp.'s IDMS for a three-month trial.



CW Photo by V. Ferrier

Dr. William E. Linn told Caravan attendees Southern Railways' programmers agreed Cullinane's IDMS would be easier to use than IBM's IMS.

The shop also looked at MRT's System 2000, but that DBMS seemed oriented to retrieving data rather than updating, which was the opposite of Southern's needs, Linn said.

Total from Cincom Systems appeared to be a simpler system and would have been the shop's second choice after IDMS, he said.

**For Lease**  
**Teletype\***  
**Model 33ASR**  
**with tape**  
**perforator**  
**and reader—**  
**\$58 per month**  
**Model 33KSR**  
**send/receive—**  
**\$44 per month**

Includes nationwide  
 maintenance service.

Call or write:  
 RCA Service Company  
 A Division of RCA  
 Two Penn Plaza  
 Bldg. 204-2, Camden, NJ. 08101  
 Phone (609) 779-4129  
 \*Registered trademark of Teletype Corp.

**RCA**



# Boston DP Center Helps Track Down Missing Students

By Edith Holmes

Or the CW Staff

BOSTON - The Boston School Department's DP center had helped out the missing students and chronically absent students from 3,000 to 1,000 over the last 2-1/2 months.

Discrepancies between the projected and the actual enrollments in Boston public schools have plagued those who must plan for the district even as classes began last September. James Dailey, School Department DP chief, said,

"We expected to have about 91,000 students," he noted, "but, by the end of November, monthly attendance figures sent to the superintendent's office by the principals amounted for only 88,000."

"Certainly, the racial upheaval associated with busing has contributed to the high rate of missing and absent students this year," William Harrison, assistant superintendent of schools, commented.

The School Department is rarely in-

formed when parent and student residence is being kept pupils home or sending them to parochial or other public schools or sometimes, illegal educational efforts outside the Boston system, he noted.

## High Absenteeism

The result has been a high rate of absenteeism, even among students who are regular attendees, he said.

"For the last few weeks, attendance has averaged from 66% to 73% of the 88,000 who have actually reported for school."

The School Department turned to the DP center for help last November, when a decision was made to have every chronically absent or missing student identified on an attendance card submitted by teachers proved unsuccessful, Dailey said.

"The DP center agreed to help, with the understanding all we could do would be to bring the projected and actual enrollment figures closer together by flagging

those students who haven't been seen before," Dailey added.

Using attendance records, report cards and homeroom assignments as criteria for identifying students with attendance problems, Dailey said two runs were made on the center's IBM 370/125.

The first program produced an alphabetical list of all students before all students with the student's number, homeroom number, sex, curriculum, date of birth, year of graduation, address and telephone number.

## Only an Estimate

Students with homeroom numbers were designated "no-shows," those who never showed up for school, Dailey explained. But this list provides only an estimate of the total number of missing students, he added.

Some principals might have assigned homeroom numbers before students arrived for the opening of school, and the possibility exists that some pupils may be

listed at more than one school.

The second program depended on grade reports to determine those students who are chronically absent, Dailey said. A student who has been chronically absent is likely to show either no grades or failing grades, in addition to a poor attendance record.

## Ongoing Search

The search for missing and chronically absent students is ongoing and involves the efforts of the DP center and the DP departments located at each school, he said. New methods were developed over the last two months, he said, "and we have been able to identify kids who weren't reporting.

"But once identified as missing or as poor attenders, students must say they're not coming back to school before they can be dropped from the attendance list.

"Unless a child says he isn't going to be in school, that seat is legally his, and the school system must plan for him regardless of whether he is there," Dailey said.

He added that the number of students who ask to be taken out of the data base is very small, resulting in projected and actual enrollment figures that are still off by 1,000.

## 'Computer Error' Law Gets Nod in Maryland

ANNAPOLIS, Md. - A new consumer law designed to help cope with problems arising from errors on computer-generated bills has been signed in Maryland.

Covering any company that does business in this state, the law specifies procedures to be followed by the consumer and the company in correcting the error or explaining why the bill actually is correct, according to Jane Howard, spokeswoman for the Prince Georges County Consumer Protection Commission.

The consumer has 60 days from the date he receives the bill to write to the company, identify himself by name and account number and state what he believes to be wrong with the bill, according to Howard.

The company must acknowledge receipt of the letter in writing within 30 days.

Within 60 days after receiving the letter, the company must notify the consumer that the error has been corrected or explain why the bill was correct originally, said Howard explained.

"During the 60 days that may elapse between receipt of the consumer's letter and resolving the claim, the billing company may not attempt to collect the amount in dispute and must not add, 'in case they give an unfavorable credit report to any credit bureau or credit reporting agency based on your failure to pay the amount in question.'

However, the company is permitted to bill the individual as usual during this period, she said.

"The company may not assess the service charge on the questionable amount, whether it is a bill or not, from the time the individual mails his inquiry until the date the company informs the customer in writing whether the bill is correct," she explained.

## Your search for the best financial control software just came to a halt.

You've just found it. The UCC Financial Control System. The best financial control software you'll find. There are over 103 reasons why:

First, it's the most complete system of its type, it features

- A single financial data base
- Full general ledger accounting
- Budget preparation and review
- Responsibility reporting
- Cost allocation and profit center reporting
- Product costing
- Statistical accumulation and reporting
- Automated systems interface
- Flexible reporting
- Easy to use report writer
- Foreign currency accounting.

Second, fourth generation design with a single master file affords easier installation and maximum operational efficiency/reliability. It allows user control with a minimum of EDP intervention. Documentation is outstanding.

Third, it's backed by the long-term maintenance and reliable support of one of the largest and most advanced computer services companies in the world - UCC.

The other 100 plus reasons are the satisfied users of UCC FCS. They're the best possible reasons why you should check out the UCC Financial Control System today.

Please send me more information:

I have someone call me about:

The UCC Financial Control System.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Telephone \_\_\_\_\_

Mail to UCC Financial Software  
P.O. Box 47911  
Dallas, Texas 75247  
Or call Michael Sheller  
(214) 637-2010

When you have  
the best people, you  
have the best  
product.

**UCC**  
UNIVERSITY COMPUTING COMPANY  
7200 Stemmons Freeway • P.O. Box 47911 • Dallas, Texas 75147  
A Wyle Company

**370/145**

For Sale

Or Lease

M.J. O'Connell  
Comdisco, Inc.  
2200 E. Devon  
Des Plaines, Ill. 60018  
312/297-3640



## Letters to the Editor

### Don't Shift Blame

After reading J.L. Down's letter about increased paper costs [CW, Jan. 29], I am amazed to see the standard scapegoat of inflation being used in our press again.

A recent major TV network news program attempted to pinpoint the "cause of inflation." While interviewing managers in every phase of a product's manufacture, from raw materials to final sale to end consumer (and covering several different products), it was consistently told, "Our costs are up, but profits are down."

We all know that money is being spent at fantastic rates, but if everyone is showing losses or just breaking even, where is the money going?

Certainly, papermills are not totally responsible for the increased cost of paper, but they must be part of it and should admit that fact.

To paraphrase Downs, crooks are not – possibly; realists they definitely are not.

J.W. Noyes

Dallas, Texas

### Grosch Not Obscene

After reading Robert C. Fish's letter [CW, Feb. 12], I rushed to my trusty Webster's *Dictionary of the English Language* to see if Herb Grosch really had exposed me to another of his

examples of obscenity or graffiti in his Jan. 22 column.

Since *Computerworld* is not a public sidewalk, wall of a building, wall of a public restroom or the like, I was pretty sure I had not been exposed to another of Grosch's examples of graffiti. That turned out to be the case.

Had I been exposed to another example of Grosch's obscenity? Well, I was employed, so to mind less obscenity, rubbish and a mess. I wonder if Fish is offended when he sees the word "lay" printed in a newspaper?

Incidentally, I've always thought Grosch was much too pro-IBM, and I'd appreciate your censoring a few IBM statements in your newspaper; I find them obscene.

Fred Littrell

Raleigh, N.C.

### Leave Arena to Caesar

In reference to Ken Lord's challenge to the Association for Computing Machinery (ACM) [CW, Feb. 5], Lord used invalid premises and invalid conclusions in castigating ACM.

ACM should leave to Caesar the political arenas; the members recognize Lord's society is not technically oriented and are therefore in a better position to view the forest with alarm.

Fred Sanson

Boulder, Colo.

## The Security Game

Readers may remember that three or four years ago IBM, in the person of Vin Larrison, made a public commitment to data security. Since then the four major projects set up by IBM and its partners have published their reports – I wrote an innocuous foreword to one volume of the Illinois results. It would be quite feasible for IBM or its competitors to build a great deal more hardware and software security into future systems: into FS, in fact.

Let's consider how the ads might read:

"We believe that during the life of this powerful new family, every customer will have some need for data and system security. Accordingly, all accesses are guarded by hardware and software and hardware and software and other peripherals are connected to internal channels via sophisticated scramblers. Data communications are heavily encrypted."

"Valuable and sensitive data will be available only to authorized electronic and human destination."

"Because this security equipment has been designed into FS from the outset, it reduces throughput and capacity only very slightly. Because it is part of every level of equipment, and not added in only a few places or for select customers, its cost is not prohibitive when installed base and is correspondingly low."

And so on – it's not hard to write copy for such a capability. But now look at the new "secure" IBM machines. Each box is scheduled and physically locked up. All password checks and encryption and decryption are done inside, where the plug-to-plug boys can no longer go. Inter-

faces are not only coded, but run through the middles of several minuscule multi-layer chips. No crude hacksaw, no handy-dandy Cannon plug can intrude.

It is not only the computer or a box of add-on memory can be unphugged and a compatible non-IBM substitute connected. But what it gets from the central system will be gibberish – and, needless to say, gibberish that changes at frequent and unpredictable intervals. And no one will understand it, stay in step.

But the cheap competitive gear is out of touch, substantially deaf and dumb and blind, until somebody works out the new code.

And remember, it could be time-dependent, so cracking it's safe, where the combination was 32 or 64 bits long and changed every few minutes under control of a clock inside the safe!

Yes, there is a real possibility that hardware and software and data will be much more secure in the post-1976, FS era. There is virtual (oh, hell, what's that?) certainty that IBM will be more secure. That was \$40 million well spent, boys!



Herb Grosch

## Heiser Tests Modified to Suit Other Environments

The Heiser tests published in the Taylor Report [CW, Jan. 29] were developed in the context of testing a record-updating routine when the file was held on magnetic tape and the programs were written in Cobol.

The 15 specific tests listed (such as "If items are added or deleted, do record counts record properly?") included ones made necessary by the environment and excluded ones not involved in checking the accurate working of the Cobol updating routine, although such tests would have been useful to check out an operational program incorporating the routine.

After the article was published, Paul DesJardin, a long-time leader in DP, reorganized these tests into different categories. His standpoint was different from Heiser's as chalk from cheese.

He was not considering the same language or the same type of data base. I don't really think he was considering the use of a program (Heiser's is a routine for incorporation into other people's program – but that makes his results more valuable).

The comparison of the DesJardin and Heiser environments is as follows:

In the DesJardin breakdown of the tests, the first category was of those that fitted the DesJardin environment. These were tests like "Does the recovery from a missing master record get reported properly?"

Second was a group of tests which, while sensible to the Heiser environment, were not needed in directly accessed data bases. Two other groups he rejected, at least until further clarification of "record control" and "sequential access" available or until association is made to the specific type in the data base.

The Heiser tests, reorganized into the DesJardin categories, are shown in the box at the right. If there is any fit at all – and there is – the tests certainly allow the development of a more meaningful set of tests. I would like to together with some ideas on how to apply them to specific circumstances.

In itself, these comments show, as I suspected, there is the germ of testing methodology in the Heiser tests – at least for file-updating routines.

### DesJardin's Additions

However, DesJardin was not content with merely reviewing the Heiser tests. Looking at the problem from a user's perspective, he suggested a slightly different view of a programmer wanting to use a pretested routine. DesJardin pointed out one essential area is missing.

He argues data file updating and auditing is essential to the maintenance of data base integrity and should be included. And, from his point of view, he is perfectly correct.

As he points out, a field that is supposed to contain a Social Security number should be able to be tested to show it is made up of three numbers, a dash, two more numbers, a second dash and four final numerics.

Put briefly, this, in DesJardin's system, is checked using the form "SOC. SEC. =

3N-2N-4N."

So, there is another item that is checked and for which checking has been worked out. There does not seem to be any reason why this check should be incorporated into a general checking system.

### Not Alone

DesJardin is not alone in having tests overviews about the Heiser tests. Alexander O'Reilly, a Centaur Management Consultants in New York told me that firm has a checklist more comprehensive than the one shown.

He, like DesJardin, adds a dimension that must be considered – that of the specific application. Centaur has been specializing

in system testing in the financial management area. This brings up the prospect that industry considerations should also be taken into account.

After all, it looks as though there is more known about testing than their lack of publication would indicate.

If you have any testing checklists, methodologies, etc., or just comments on the DesJardin, Heiser or O'Reilly commentary, I'd like to hear about them so they can be passed on to other readers.

© Copyright 1975 Alan Taylor. Reproduction in whole or in part is prohibited without permission. Limited numbers of copies for non-commercial purposes may be made provided the copyright notice is present. The views expressed in this column do not necessarily reflect those of Computerworld.

### DESJARDIN'S CATEGORIZATION OF THE HEISER TESTS

#### AREA ONE: Tests Applicable to Direct Access as Well as Sequential Access Data Bases

- Does recovery from a missing master record operate properly?
- Does the occurrence of a missing master record get reported properly?
- Does the recovery from an attempt to add a new master record where one already exists operate properly?
- Does the occurrence of such an event (e.g., adding a new master where one already exists) get reported properly?

#### AREA TWO: Tests Applicable to Direct Access Data Bases

- Can records be added before file-start?
- Can records be added after file-end?

#### AREA THREE: Tests Which Need Concept Clarification Before Acceptance

- If items are changed, do record counts record properly?
- If items are added or deleted, do record counts record properly?
- Does the recovery from sequence error operate properly?
- Does the occurrence of sequence error get reported properly?

#### AREA FOUR: Tests Which are Superfluous

- Is the current data changed by the change process?
- Can records be added?

#### AREA FIVE: Tests Which Need DataBase Definition Before Being Used

- If items are changed more than once, is the last change recorded?
- If an item is added and then changed, do both functions record properly?
- If an item is deleted after a change and an addition, does the activity record properly?

DesJardin	Heiser
Microdata Reality	IBM 360/370-Type
Language Type	Basic in Proprietary Form Standard Form
Data Base	Direct-Access Data Bases
	Sequential Tape Data Base

## Letters: Readers Keep Licensing Debate Open

### SCDP Willing to be Flexible

### But Will Pursue Its Course

Our many thanks for the editorial, "No Guarantees" (CW, Feb. 12). While we may not agree with everything in it, we do appreciate the fact that Computerworld has opened up the licensing as the serious question it really is.

We claim very specifically *not* to have all the answers and we do not, nor have we felt since we began this action, that the bill is in and of itself an absolute, or that the bill is an absolute solution to the dilemmas we seek to correct.

We are more than willing for the bill to be treated by a legislature as a flexible instrument, to be modified as necessary and made workable.

Yes, we can agree that people will be people and there can be no means whatever to legislate morality. But CW's editorial omitted one very critical point. That there are unethical doctors and lawyers, or even certified public accountants (CPAs) we do not dispute. But each of those professionals has a code of ethics that has the ability to disbar such a practitioner, to legally prevent him from practice, to keep him from further harming those whom he serves.

Our concern is simply this: There is no profession where there is not also the ability to exclude someone from the practice of that profession. We do not enjoy this in the DP field today; we merely shift our incompetents from organization to organization.

What we seek is not to license all DPers, but to create an entirely new classification called "Certified data processing professional." Yes, the requirements should be stiff. Yes, the credential should be difficult to obtain, even to the point where some already qualified practitioners would not qualify. A certificate in Data Processing (CDP) included, would have to hit the books to obtain it.

We recognize this is not the burning issue for legislators, at least until some legislators begin to see the ramifications and the need to do something about it.

But it is very much a part of the same issue which, if boiled down, could be stated as follows: There simply is no commonly accepted practice for data processing.

We're willing to be flexible on the issue.

We would welcome the other industry groups taking a hand in making such legislation work. If the industry, as a whole, were to undertake an organized, funded and committed activity to establish a commonly accepted practice for DP, then we could consider modifying our stand, or delaying it until that practice is defined.

So, you see, Mr. Editor, it's not a game and it's not politics. It's an issue about which much serious consideration was given, a great deal of work was done, and much debate within our group was conducted. It's an issue which we'll continue so long as our resources permit.

But it's not a "tempest in a teapot."

The concept is workable, if given a chance. It will be the efforts to block it that will "hold back innovative solutions."

Kenniston W. Lord, Jr.

President

Society of Certified Data Processors

Hudson, Mass.

### Another Reason

I very much agree with your editorial doubts on the efficiency of licensing for data processing. I share. I would like to add one more reason to your list.

Unlike doctors, lawyers and certified public accountants (CPAs), computer people are not usually independent of the firm for which they are doing work; they are employees. They are not free to say what they, as professionals, will do or not do.

How is this certified professionalism to be implemented, since few DPers can say of a project that it is abusive and must be modified or they won't have any part of it?

Professional DPers can warn, persuade and educate non-DP managers, but they cannot usurp their authority and should not be their scapegoats.

Susan H. Lewis

Waltham, Mass.

### Self-Education Enough

In the last analysis, each DP is dependent for his paychecks on his job and his clients. It is a thought that, if we all work harder at our jobs, we would be more professional.

If you want young, qualified DP people, help your company grow and DP will also grow. Through self-education and re-education, the concept of DP is a part of a team that makes your company the winner it is, you can find the self-regula-

tion that only knowledge can produce.

R.E. Sennet

Streamwood, Ill.

### History Teaches Otherwise

As chairman of the American Federation of Information Processing Societies' (Afips) Professional Standards and Practice Committee, I couldn't let you get away with your Feb. 12 editorial.

You concluded that, because there are a few baddies around in law, medicine and auditing, licensing in those professions is ineffective.

A quick look at the history of professions in the 19th Century shows the disastrous effects of unlicensed professions that have the beneficial effects of licensing.

If you want young, qualified DP people, help your company grow and DP will also grow. Through self-education and re-education, the concept of DP is a part of a team that makes your company the winner it is, you can find the self-regula-

tion that only knowledge can produce. as society at large, more effectively. Probably through public courage, legislation will force the responsibility on DP occupations through licensing.

Personally, I would like to see an orderly progression of licensing when DP has reached the maturity to make it worthwhile. The Institute for Certification of Computer Professionals (ICCP) will play a major role in getting us there someday.

Donn B. Parker

Menlo Park, Calif.

### Point to the Source

All the talk about professionalism in the computer industry is fine, but we need to face up to the reality that a lot of what we have to deal with starts not with computer programs written by others, but with systems programs written by programmers employed by the computer manufacturers.

(Continued on Page 11)

# GREAT COMPUTER SECRETS\*



GCS 2100

Computer system.

*(Continued from Page 10)*

Too often we are flooded with partially or, worse, undocumented software that uses nonstandard symbols and confusing mnemonics.

If we are going to point a finger, let's point to the source of a lot of our problems.

Ernest Stittner

Boulder, Colo.

## Too Much Lip Service

I wish to add my support to the Feb. 12 editorial. The myth of "DP professionalism" can and has done incalculable harm.

The ideal of DP as a service organization which is highly user-oriented is given a great deal of lip service. The reality of the situation is that this has become suspect when DP people blather endlessly about being "DP professionals," thus giving the impression that it is DP per se which is important — not DP for a specific task but DP just to be proceeding.

Is it any wonder that barriers of suspicion exist between users and DP groups?

Communications between users and DP people is the greatest single problem in DP and the failure of DP people to identify with users is a major cause of that problem. The increased "clannishness" certain to occur with the encouragement of professionals to be "DP" will tend to compound the problems of identification and communication.

Licensing will increase the problems of communication by creating a provincial, protected, "professional" status for favored DP people.

Terry E. Davis

Kansas City, Mo.

## CDP Means Nothing

Many people who hold a CDP are very competent in their positions and execute their responsibilities with effectiveness.

On the other hand, several CDPers almost closed down the installation where I work because of personal goals and unawareness of our company's needs.

Thankfully a few executives of our company, DP was given a chance to dig itself out of the hole it was in. No thanks to

any piece of paper hanging on the wall!

R.W. Bryant

Colorado Springs, Colo.

## CPAs a Poor Example

The Feb. 12 editorial noted CPAs have not generally discovered legal political contributions made by companies whose statements they were examining. This is cited as evidence that a state license does not prevent its holder from having failing to be successful in his or her quest whether the evidence is supposed to demonstrate immorality, incompetence or gullibility. While I agree with the original proposition, the example was inappropriate.

To say a CPA certifies financial statements is to say that, in his opinion, they are fairly presented. Among other things, fairness implies the lack of "materially" incorrect representations on a financial statement. Rough synonyms for "material" in an auditing sense are "important" and "financially material."

For a law company, it is always important and usually impossible for a CPA to reconstruct every financial trans-

action that has taken place during the year being reported on. He must and should confine his most searching examination to material items.

As a management services consultant, I am not involved in the licensing controversy, but as a CPA I am at least equally concerned with the public image of that profession.

William H. Handelman  
Southfield, Mich.

## Protection by Bureaucracy

I have seen no evidence which indicates the licensing of professionals in any area has any beneficial effects on society.

In my opinion, those who are attempting to force the licensing of DPers are trying to create a bureaucracy which they can yield power over the lowly professionals they are pretending to protect.

These licensing advocates will devote most of their lives to this attempt because they view it as great monetary rewards if they succeed.

They are most likely to be successful through the legislative route because they will be dealing primarily with lawyers who have established a similarly unnecessary bureaucracy.

I hope that the licensing promoters will be unsuccessful, but, from past observations, I know that they will be successful sooner or later.

Herbert A. Morris

Poria, Ill.

## Ability the Key

It seems to me that if the so-called professionals who are pushing the licensing legislation would put as much time and energy into developing better systems for their companies, to make them perhaps more competitive, would be recognized for their abilities without having a license stating, "Hey baby, I'm a professional."

The day I implement a system which doesn't work or bring it in significantly over budget, I will probably be thrown out on my ear. The possession of a lack of a license is not going to change that.

Thomas L. Palmer

Elkhart, Ind.

## Educational Bigotry

We now find members of our own profession implying that many of us are crooks and incompetents. Ken Lord and his associates feel legislation is required to eliminate the undesirables, the undesirables being those without higher education and specific training.

It is amazing that four years of higher education equals years of on-the-job experience. It is also amazing that being certified makes one an immediate professional.

Lord should, if possible, remove his head from the obvious place it now resides. Educational bigotry has no place in this profession.

Certification must be viewed as an individual preference. It should not be dictated by those who view it as a means of financial reward or as a status symbol.

James E. Harper

Palatka, Fla.

## Certified Systems Necessary

I believe there is a need for licensed DPers. Not every organization needs one, but any program seriously affecting either the well being of individuals or the community should be certified by someone who is going to jail if the product is not certified.

I note that much opposition to licensing comes from managers. Establishing independent standards certainly cuts into their prerogatives to set criteria, which affects the bottom line of a profit-and-loss statement rather than any common good.

Major hardware vendors also would be challenged if DP standards were taken from their hands.

Hugh Cort

## A Programmable Extension Package (PEP) extends the power and the flexibility of the 2100 system

up to 255 PEP tables provide capabilities like automatic data insertions; range and value checks; table look-ups; logical tests; character expansion (the operator keys S.D., S.D. South Dakota is generated on output); and automatic format switching.

And because these tables are not job assigned, they can be used on several different jobs. (Note: no programming experience is needed to work with PEP.)

A library of over 100 special edits is also available. It handles things like field relocation; special balancing routines; manipulation of constants; and output editing requirements. (If there isn't an edit for your needs, we can design one.)

The GCS 2100 also provides up to 99 format levels per job; up to 255 balance accumulators; variable length record and blocking factors; and up to 255 jobs stored in the system.

**GCS DataTel:** provides remote batch communications capability between the GCS 2100 and other 2780-compatible terminals and mainframes. And since the batch transmission of data is directly from disc to another mainframe, the usual step of transferring data to tape can be eliminated.

**GCS DataTone:** is a low-cost, efficient and convenient method for collecting numeric data from remote sites. It is designed for updating inventory, shipping documents, orders, etc.

DataTone answers automatically and handles up to thirty-two incoming lines at once.

With DataTone, the GCS 2100 system can accept incoming telephone data, output incoming data, and from the terminals.

**GCS DataText:** is a multi-purpose shared-processor approach to word processing. Designed for high-volume typing requirements, it is a fast, efficient, low-cost method for producing customized letters, envelopes, forms, labels and reports.

And since DataText uses a disc library, manual handling of storage media like cards, cartridges, etc. is eliminated.

If you'd like to get in on more Great Computer Secrets, contact Agent 2100 at General Computer Systems, Inc., 16600 Dooly Road, Addison, Texas 75001. (800) 527-2568 toll free. In Texas (214) 233-5800.

**GCS 2100**  
general computer systems<sup>inc</sup>

Birmingham, Ala.  
Birmingham, Ala.

Introducing...

# POWER/VS ACCOUNTING

Finally . . .

Information necessary to properly MANAGE  
a DOS facility is available.

- TURNAROUND AND QUEUE TIMES by Job - Customer - Remote ID - Time of Day - Type of Run
- PAGING STATISTICS by Time of Day - Job - Program - Partition
- FREQUENCY DISTRIBUTIONS by CPU Time - Elapsed Time - Turnaround Times
- TREND ANALYSIS of Systems Resources
- MEASURE HARDWARE CAPACITY
- COMPUTER BILLING by Resources Used
- DISTRIBUTE FIXED COSTS
- BUDGET

## Operational Now . . . at customer sites

Our Report Writer can produce your existing report formats . . . plus provide the added benefit of management data never before attainable.

This System is now only in name. Johnson Systems has been able to respond to this requirement in a timely manner because of our vast experience with OS/SMF and DOS Job Accounting. The System has gone through several major revisions over the years with the help of over 300 users. It was designed to expand. As changes are imposed by IBM, or enhancements dictated by customers requests, Johnson Systems responds.

Let us help you cope with IBM changes . . . Our OS System is 100% compatible with the DOS System if you are considering going to OS. We make it easy. There is a 30 day (no obligation) acceptance period. Write or call.

### FAST BECOMING THE STANDARD



Johnson Systems, inc.

The Grant Building / Westgate Research Park / McLean, Va. 22101 / 703-893-8700  
Santa Ana, California / 714-835-2322

Oak Brook, Illinois / 312-325-7740

## Overpaid School Aide Sued for Extra Wages In Payment Mix-Up

HOLIDAYSBURG, Pa. — School district officials here claim a "lack of experience" with a payroll system resulted in the overpayment of \$1,259.76 to a teacher's aide and, in an effort to recover the money, the district has sued the aide on the grounds of "unjust enrichment."

Jeanne Homsey was hired by Intermediate Unit 8 (IU8) in October 1972. One year later she received a letter stating there was a mix-up, equaling \$530.92, in the amount paid her during the year.

Homsey, who was then a teacher's aide, dismissed from the job in May 1973, the educational unit kept paying her until Aug. 24. She received a total of \$728.84. Earl Bonnet of IU8 said it's traditional to pay sides through the summer months, but when Homsey and three others were fired no one programmed the computer to stop payment.

### Inexperience Blamed

The school unit recently converted to a computerized system with which it had no prior experience. Bonnet claimed that was the reason for the error.

Some aides had contacted IU8 as early as November 1972 inquiring if they were being overpaid, according to Homsey. They were told the office doesn't make mistakes, she said.

The other three aides have agreed to pay back the overpayment, but Homsey refused and is being sued for the amount overpaid her during the summer.

## Threatened Suicide Averted by DP Center

CINCINNATI — An early morning phone call threatening suicide recently prompted city police and the University of Cincinnati (UC) official to call upon the resources of UC's computer center, hoping to prevent it in time.

Cincinnati police received a call from a pregnant young woman saying she was going to kill herself. She told them only her first name and the fact that her husband worked at UC.

While the woman was kept on the line, a series of phone calls ensued, beginning with a call to UC police.

### Fed Wives' Names

Not having enough information, the campus police called James Eden, UC's vice-president of management and finance, who turned around and director of the DP center, Robert Caster.

"Caster brought in a programmer who fed the first names of wives of employees who live in a certain district, combined with their zip codes, into the computer," Eden said.

Within a half hour, city police were given three names and address possibilities. One of three patrol cars dispatched arrived at the scene, and the suicide was averted.

AT LAST. A DOS/VS PARTITION BALANCER  
THAT REALLY WORKS

GOALS: INDUSTRIAL COMPUTER



GOALS: INDUSTRIAL COMPUTER

LIBRA

# SOFTWARE & SERVICES

## Random Notes

### UCC Extends Tape Manager To Cover Multidata Sets

DALLAS — The capabilities of University Computing Co.'s (UCC) tape management system, UCC One, have been extended to cover multidata set volumes which are a combination of several sets that have been expanded and combined.

The audit data set is used to restore the tape management catalog (TMC), the key to the operation of UCC One, the company noted.

Passive error security has been added to the system. So has a capability to record temporary error statistics, while an on-line inquiry feature enables the operator to review and update the TMC.

UCC One uses approximately 1K of core plus SVC transients and sells for \$10,000 from UCC at 7200 Stemmons Freeway, 75247.

### Basic/Four Program Fits Distributor's Needs

CHESTNUT HILL, Mass. — Distributors can utilize the Basic/Four small business computer system to handle everything from order entry and invoicing through reports to regulatory agencies, if needed, with a highly modular software system developed by Human Integral Systems.

The system was put together specifically for liquid distributors but much of its logic can be used by distributors with other products. The system can handle the smallest Basic/Four and costs from \$20,000 to \$30,000 depending on the "modules" required, the vendor reported from 1238 Boylston St., 02167.

### 'Aptrec' Written in Cobol, Eases Apartment Management

BIRMINGHAM, Ala. — Accounts receivable for large-scale multiple unit apartment complexes can be handled on a user's in-house system or through a service bureau with the Aptrec system now available from Aptrec Systems, Inc. The system accepts any number of units, posts rentals due and large charges and generates a variety of reports. The choice of reports wanted at any time is controlled by the operator at runtime, the vendor noted.

The disk-based Aptrec is written in Cobol and runs in 35K. It can be acquired now for \$4,500, which includes on-site support, from the company at 37 Seven-teenth St. West, 35208.

### Oxford Sells 'Sprint,' 'D'fast'

FORT LEE, N.J. — The Dynamic File Allocation System (Dfast), developed by Tower Systems, Inc., and the Sprint packages, developed by Jason Data Systems, Inc., are now both being marketed to IBM DOS users by Oxford Software Corp., 511 Main St., 07024.

## Package Cuts Run Times...

# Proud Operations Staff Welcomes Aid

By Don Levitt  
Of the CW Staff

DURHAM, N.C. — Even when you have a lot of pride in the abilities of the staff you have assembled, there are times it makes sense to acquire and then use a packaged approach, according to Tom Worley, operations manager of the DP center of Blue Cross/Blue Shield of North Carolina.

Worley and his staff of 16 have their hands full with the care and feeding of a 1.5-MB IBM 370/155 running under OS/MVT Release 21.7. He expects to move to a 2.5-MB system in 370/165 next year. Dynamic Address Translation (DAT) box if we can find it" — to be ready for national health insurance, but the present configuration is running "very well."

Worley has a crew of operator and support personnel that has written its own tape control programs and has converted the center's program library from DOS to OS. The operators have also converted all but a dozen 1401 Autocoder programs to Cobol so they could run more effectively on the newer IBM gear.

They use the OS Job Accounting

Report System from Johnson Systems, Inc. to monitor and improve their overall operation.

The Johnson package pleased Worley right from the start. He wasn't on the decision to get it, but was impressed with the ease of use and the results.

"The Johnson salesman came in with it," he said. "He linked it into our system and we've been running with it ever since."

"Running" seems a good word for the Blue Cross/Blue Shield DP center here. It

is heavily IMS-oriented with 22 remote and 109 local terminals, and it runs between 6,000 and 7,000 job/imo on a five-day week, three shifts a day operation.

It had only a quarter hour of downtime last month, and none the month before that, Worley noted with justifiable pride.

### 'Crunchers' Spotted

The job accounting/system utilization system from Johnson has several big advantages, he added. "You can see which programs are the big culprits. You can analyze the data and find out why [they hog so much of the system resources]."

Big payoffs, too. "We've had one run that we cut from three hours to one hour, just by utilizing the Johnson System output."

In another situation, the IMS control program utilized 675K bytes of memory in prime time. Although the job accounting reports haven't been able to cut that dramatically, they have trimmed it somewhat and made sure that the space allo-

cated is really used.

The cost allocation capabilities of the package are just now coming into use at Blue Cross/Blue Shield. The DP staff has spent months working with the accounting department to develop accurate and acceptable chargeback schemes for the various user segments.

The whole concept has been under development about a year, Worley said, but the reports for the users have been available for just the past three months. Actual chargebacks are not being made yet, he added, but the users are apparently becoming more conscious of the computer resources they are using — or, aware that additional requests will ultimately result in additional charges.

The flexibility and power of the Johnson System package recommended by Worley is a major reason for its development at the large installation in which he worked before coming to Blue Cross/Blue Shield.

That was \$50,000. "But it's nothing much more than I have here for \$4,000."

## Developer's Package Describes Low-Overhead, Isam-Like Access

### Help Wanted

WASHINGTON, D.C. — American National Standards Committee X3 — Computers and Information Processing has okayed the development of a standard for interchangeable ASCII data files.

The project, under Technical Committee X3/X3.5, is directed toward establishing the required properties of data files in interchanges between dissimilar systems.

Members of the DP community interested in working on the standard "would be most welcome," according to X3's secretary, Robert M. Brown, who asked volunteers to contact him at the Computers and Business Equipment Manufacturers Association (CMEA) here.

As part of the work done to decide if such a standard would be feasible and desirable, X3 has already determined

that certain guidelines must be followed, Brown said:

- The files will be stored only on magnetic tape, in agreement to American National Standards.

- The files, when stored, will be associated only with approved American National Standard labels and data organizations.

- Characteristics will be of logical aspects, i.e., not physical dependent, although the special requirements for control of certain hardware functions such as communications control will be included.

- ASCII will be the only allowed representation of the data in the interchange files and the standard ASCII.

- The file types will be general and not application dependent.

CMEA is at 1828 L Street N.W., 20036.

The copyrighted approach is described in narrative and flowchart form and illustrated as a sample program (in RPG-II) provided by the developer. But the user has to apply the concepts to each programmatic situation.

The method may be used for any sequential disk file and with any programming language that allows direct access to relative record numbers. The number of records in the file must be known, and the file must be sorted (in either ascending or descending sequence) for the approach to successfully utilized, the company added.

Duplicate records are acceptable and the method can be used to access either the first or the last of any group.

Although it provides advantages compared to other sequential methods, the Cook's approach uses the actual file data and not one or more separate indexes. Thus search overhead is reduced, and indications are that the larger the file, the more the approach outperforms normal linear search.

The logic of the approach is deceptively demanding, the developer admitted. It looks obvious and simple, but must be followed very closely or the access will be reaching "God knows where," systems manager Cliff Friesen, said.

The developer's package can be acquired for a license fee of \$1,000 and is available now from Cook's Systems Department, 807 South Broadway, 57201.

## MMS General Ledger makes Financial Reporting look easy.



Giving everyone the financial reports they need, when they need them, exactly as they want them is easy if you use the MMS GENERAL LEDGER. It's the most powerful ledger on the market and it's hard at work for more than 200 leading companies.

Best of all, MMS GENERAL LEDGER is totally flexible, operating under DOS, O/S, IMS, DL/I, IDMS, even TOTAL.

Get the World's No. 1 General Ledger. And watch your financial reporting capability soar to new heights!

I'd love to get my financial reporting capability off the ground.  
Please send me more information on your...

General Ledger  Accounts Payable  Accounts Receivable

Payroll  Payroll  Payroll

name \_\_\_\_\_ title \_\_\_\_\_ system \_\_\_\_\_

company \_\_\_\_\_ street \_\_\_\_\_

city \_\_\_\_\_ state \_\_\_\_\_ zip \_\_\_\_\_ phone \_\_\_\_\_

new York (212) 332-0094 Chicago (312) 729-7410 Atlanta (404) 255-0020

San Francisco (415) 798-4256 Los Angeles (213) 667-0521 Toronto (416) 862-5504

**SOFTWARE  
INTERNATIONAL**  
Elm Square, Andover, Mass. 01810 (617) 475-1040

## Distributors' Seminar Told

# Remote System Aids Inventory Control, Cash Flow

By Don Leavitt

Of the CW Staff

TAMPA, Fla. — Computer-based monitoring of sales and inventory turnovers can bring marked improvement in both the cash flow and inventory positions of wholesale distributors, according to

panelists at a recent seminar.

The session was sponsored by Dtronics Corp., the Western Union operation that provides just such products to distributors, based on an IBM 360/90 in Cherry Hill, N.J. and Maryland Heights, Mo. The service includes turnkey installation

of programs accessible through GTE Novar terminals at user locations.

Once it moved to Dtronics about two years ago, a local distributor in Buffalo, N.Y. took a hard look at the reports being generated and discovered "nearly 20% of our inventory investment was dead stock," Paul Mansell, general manager of the fluid transmission industrial division of the distributor, said.

He had known the problem existed, but couldn't pin down the unwanted items under the manual system the company had been going to Dtronics.

"The computerized system put the names of the dead items in black and white so I couldn't miss them," Mansell said.

"Because last year was a time of scarcity, we were able to return almost nearly all of this nonmoving stock to the vendor and reinvest our money in more popular inventories," he added.

Mansell was very high on the support provided by Dtronics during conversion. Aside from getting the terminal, he only had to set up with their very able assistance his product file "based on suggestions Dtronics made from their experience with other companies."

The program logic was provided and no maintenance is done by Power Drives. The distributor has no DP staff — "all we have is one girl sitting here slapping information through our Novar all day long," Mansell said.

Ernest Trampush, vice-president of Refrigeration Equipment Co., a heating/air conditioner distributor in Kansas City, Mo., reported similar inventory gains through the use of Dtronics, but solved another problem as well.

The company has five locations in Missouri and Kansas. The in-house IBM

System/3 had no communications support for terminal operations; Dtronics obviously does.

Under the old system, Trampush had to ship invoices and other materials overland between Kansas City and Wichita and Topeka, Kan., and Columbia and St. Joseph, Mo. The time lag that imposed put a handicap on the company's cash flow, he said.

Inventory control was the big thing on his mind, though. "In six months, working with our five branches and studying the computer reports, we were able to reduce 80% production in our nonmoving items," he said.

The firm was also able to transfer stock where sales at one branch to another where the market was better, Trampush added. Overall, the company at one time had about 500 individual items of inventory at each location.

"We're down to 17,400 and we're going to take another good whack at it after the year-end reports are in," he said.

The application library available from Dtronics is a valuable tool for getting started in accounts payable, check writing and general ledger, but users can choose just the portions they want. Trampush noted his firm does "all our invoicing and invoice-related sales reports, and we're getting inventory management, but we're not on payables and general ledger, though we're moving in that direction."

The move seems more likely now that Trampush's organization is being consolidated. Each of the branches had been a separate company, and that made for some problems in bill paying, the executive explained.

With elimination of a tax advantage that

(Continued on Page 17)



JUST ONE OF THE MANY LEADING COMPUTER COMPANIES YOU'LL BE SEEING AT THE 1975 COMPUTER CARAVAN Cincinnati Milacron will exhibit its new series of Remote Batch Terminals for communicating with IBM 360/370, CDC 6600 and UNIVAC 1100 Computers.

The basic system consists of a CIP/2200B minicomputer, card reader, printer and Video Display Terminal. (Disk Drive optional)

## The Computer Caravan/75

The traveling computer users' forum and exposition

sponsored by COMPUTERWORLD

797 Washington St., Newton, Mass. 02160 (617) 965-5800

ATLANTA • PHILADELPHIA • HARTFORD • NEW YORK

CLEVELAND • CHICAGO • ST. PAUL • SEATTLE • SAN FRANCISCO



JOIN THE

## SOFTWARE RUSH!

TO THE

### SOFTWARE DIRECTIONS '75 程序产品会议

This is a different kind of meeting. Rather than vendors talking at you — we'll have users talking with you. Twenty-seven — count 'em — twenty-seven of the best selling systems software products will be discussed — not in terms of how they work or their technical attributes, but in terms of why they were selected by the user, the economic benefits expected and received, the benefits expected and received, is the vendor responsive, the training good, bad, or indifferent, etc. In short, the management-oriented elements.

All of this presented by an experienced user of the product from his own knowledge. You'll have time for questions, too. And the vendors will be there if you decide to explore a product further.

International Computer Programs, Inc.

2506 Willowbrook Parkway/Indianapolis, IN 46206/Telephone (317) 297-4274/Telx 27-2226 (ICP IND)

WHEN? April 22 — 24  
WHERE? Sheraton Park  
Washington, D.C.

WHAT? Twenty-seven best selling  
systems software products

HOW? Phone or write ICP and ask  
that registration materials  
be sent to you

HOW? \$360 registration, or \$300  
if prepaid prior to March 24



## User-Formatted DOS/VS Dump Eases Debugging, Maintenance

SAN FRANCISCO — GBADump from GBA International is a \$425 enhancement to the memory dump routines supplied by IBM with DOS/VS. The independent's package cuts the supervisor portion of a dump to a few pages of formatted information.

Under "real" DOS, the size and content of a memory dump were fairly manageable, but with the VS implementation, and the vastly larger supervisor it requires, the dumps have generally become unmanageable, GBA said.

With IBM-supplied routines, there are many pages of printout devoted to the supervisor and only indirect means of finding most of the information needed to debug the problem that caused the dump, the independent explained.

### GSI Links Mark IV To 'Any' Data Base

WOODLAND HILLS, Calif. — A new release of the Mark IV file management system from Informatics, Inc. features a Generalized Systems Interface (GSI) which provides access "to any data base system now available and to any which may be developed in the foreseeable future," according to the vendor.

Described as a new approach to integrating data base management systems, GSI also simplifies the cross-program communication between Mark IV and other high-level languages. The current release contains numerous improvements and emphasizes interfaces to IBM's DL/I, under DOS/VS and to Cincos Systems' Total, Version 7.

#### Even on Siemens

Mark IV systems operate on IBM 360/370 equipment under DOS, OS/VS or CMS environments; Univac Series 70, under DOS, and Series 90, under DOS or OS/400, and on Siemens 400A configurations.

Unlike many enhancements, the GSI release is not being automatically distributed free to current users. The release is \$1,000 for all users, instead, for \$3,700, the vendor's staff reported. Informatics is at 21031 Ventura Blvd., 91364.

Instead of that, GBADump extracts and prints with narrative captions all pertinent system generation parameters. In addition, the Program Load Address is clearly identified in the GBA dump along with many words ("Program Load Address =?" followed by the address).

The printout also provides the user with Physical Unit Block (PUB) tables, Channel Queue tables, Logical Unit Block (LUB) tables and "all associated JIBs," GBA said.

Through the information formatted by GBADump "should be enough for most normal debugging," the package allows the user to switch between the new approach and standard IBM dump routines by the setting of a single bit switch under Job Control Language (JCL) or at the command line, a spokesman noted.

The package is available now from GBA at 2670 Leavenworth St., 94133.

### IDMS Gives DBA More Power

BOSTON — The data base administrator (DBA) can now have more power to alter, or limit each of the three major functions performed by a program under a new version of the Integrated Data Base Management System (IDMS) from Cullinane Corp. IDMS Release 3.1 also adds to the security of the data base by allowing the DBA to "lock" or "unlock" records from the data even more than had been the case under previous releases.

Under the new release, any of the six usage modes — retrieval, protected retrieval, exclusive retrieval, updated, protected updated or exclusive updated — may be individually "locked" (disabled) for each area in the subschema.

In the same vein but at the record level, any of the Data Manipulation Language (DML) commands — Find, Get, Open, Insert, Delete, Update — may be individually locked for each record in a subschema. This provides

the DBA with still another level of control over the data base.

The set-oriented DML commands — Insert, Delete — may be individually locked for each set in the subschema.

Improved data independence is available in IDMS Release 3.1, according to Cullinane, with the newly implemented ability to select only certain data elements or groups in each record to be "seen" by a program through the subschema.

With this added support, record occurrences in an IDMS data base can be expanded and elements or groups in a record can be deleted without impacting application program logic or even forcing recompilation.

Basic IBM 360/370 gear costs \$37,500. Users expecting to run multiple tasks concurrently will also need the Central Environment module for an additional \$7,500. A Cullinane spokesman noted from One Boston Place, 02108.

# Laid Bare.

Frank disclosure of all EDP equipment characteristics and capabilities, presented in tabular format for fast, accurate comparisons and evaluations.

Exclusive with GML Reviews.

The only basic tools you need to compare, judge, select EDP equipment.

Updated twice a year.

Completely slanted.

1975 editions now available.

Guaranteed: If you're not satisfied with any GML Review, return it for a full refund.

Characteristics, capabilities, prices, market data.

#### Computer Review

Detailed overview of central processors, related peripheral devices and systems. 5" x 7" approx. 200 pages. Published in January. Updated inserts issued in April/August. One year subscription \$45.

#### Minicomputer Review

Basic reference guide to the entire minicomputer field. 7" x 10" approx. 300 pages. Published in January. Updated inserts issued in April/August.

One year subscription \$39.

#### Contents:

Individual reviews of over 140 minis, by company and model.

Hardware characteristics

Peripherals

Software

Condensed price chart

Company profiles

#### Terminal Review

Comprehensive equipment and market information on all terminals and manufacturers.

5" x 7" approx. 100 pages. Published in January/September.

One year subscription \$37.

Contents:

Over 300 terminals and their peripherals

Plug compatibility with IBM, Univac, Teletype

Keyboard displays

Teletypers

Remote Batch terminals

Marketing data/directory of manufacturers

Peripherals Review

Complete coverage of I/O and data storage devices made by independent manufacturers.

5" x 7" approx. 100 pages. Published in February/June/October.

One year subscription \$39.

Compiled and published by GML Information Services

594 Marrett Rd., Lexington, Ma. 02173

#### Order Now

Check the Reviews you wish and mail this form to GML Reviews, P.O. Box 612, Lexington, Ma. 02173.

You will be billed later. All overseas subscriptions are \$20 extra.

Minicomputer Review       Peripherals Review

Terminals Review       Computer Review

name \_\_\_\_\_ title \_\_\_\_\_

firm \_\_\_\_\_

address \_\_\_\_\_

city state zip \_\_\_\_\_

**GML**

Special library discount: 10% on orders for any 4 Reviews.

Quantity discounts available to firms for sales staffs or distribution to customers.



#### SAVE 50% AND MORE!

If you're not having your computer ribbons re-linked by RPM, you're losing money. RPM can effectively re-link one ribbon in 10 seconds. And it does it with standing quality. RPM is fast, too. We inspect, re-link, re-wind, shrink-wrap, package and mail your ribbons back to you within 72 hours of receipt. Write or call for information on our inventory control program. Gilmore, 369 S. Robertson Blvd., Beverly Hills, Ca. 90211 (213) 657-0620

**Computer Ribbon Corp.**

# Of course you should.

The EDP Seminar Series gives you the information you need to keep ahead of this fast-changing industry.

We've selected leading experts from around the country to give seminars on some of the most important topics on today's EDP scene. These seminars are current, practically oriented, and packed with detailed information. They will help you save time and money. And they can give you the information you need to increase your installation's efficiency. In an increasingly complex and fast-changing EDP world, these seminars are even more important to your company, your installation, and you. Here is our current seminar schedule:

## Data Communications

### Course #1010 -

#### Practical Data Communications Systems and Concepts

This course will give you the information you need to master the newest developments in Data Communications. Led by the nationally recognized telecommunications consultant, Dr. Dixon Doll, the course covers recent changes in areas like SDLC, HD-LoD, DOS, newly approved major revisions to WATS, and the impact of materials carriers. This seminar runs two days, and total cost, including workbook, reference materials, luncheons and continental breakfasts is \$350. Additional registrants from the same company qualify for a reduced rate of \$300. Current schedule is as follows:

Chicago - Jun. 2-3  
Orlando - Jul. 3

Washington, D. C. - Jun. 10

### Course #1020 -

#### Advanced Teleprocessing Systems Analysis and Design

This course is a follow up to Course #1010, with special emphasis on problem solving techniques for minimizing operating costs in commercial data communications networks. Also led by Dr. Dixon Doll, the course covers procedures, approaches and algorithms for evaluating and cost-optimizing network organizations.

This seminar runs three days, and total cost, including an extensive set of customized course materials, luncheons and continental breakfasts is \$450. Additional registrants from the same company qualify for a reduced rate of \$400. Current schedule is as follows:

Los Angeles - Jun. 18

## Contracting for Computers and EDP Support Services

### A seminar that can help you protect your EDP investment - and your system.

In an industry that's famous for its "promise them anything" attitude, you need good, effective contracts from the vendors that supply your installation. And this seminar gives you the information you need to get them. It will show you how to protect your installation from late delivery, poor performance, poor services and the costly disruptions that they can cause. Course topics include the lease and purchase of computer systems, separate hardware and software - plus the issue of time sharing, data processing services and consultation - and the use of facilities management.

Under the personal instruction of Roy N. Freed, a nationally known lawyer, author and expert in the field of computer law, you'll learn how to place yourself in a strong bargaining position, how to measure the time demands of exactly what you want, how to set reasonable performance standards for warranties and much more. You'll also receive a complete resource notebook, including sample vendor contract forms.

You should attend this seminar if you are involved in the purchase of EDP equipment or services, whether as a corporate counsel, contract administrator, DP manager, consultant or officer of a firm.

Cost for the entire 2 1/2 day seminar, including complete resource notebook, continental breakfasts, luncheons and coffee breaks is \$750.00. The current schedule:

Atlanta New York      Stouffers Atlanta Inn  
St. Moritz

April 23-25  
June 4-6

## Key-to-Storage Systems

How to evaluate and optimize your key-to-storage equipment. Data entry is a big problem - and a big headache - as every computer user knows. It is therefore a prime target for cost savings. This course is designed to help you in the practical aspects of selecting, installing, and making the best use of keyboard-to-storage systems. It is an expansion and an update of our successful key disk seminar. Under discussion (including some user case studies) will be:

- Introduction to data entry concepts (keypunch, buffered keypunch, keypunch, key-disk and beyond)
- Key disk hardware and software      • Evaluating and starting... key disk systems
- Selecting and operating intelligent terminals, both key-to-cassette and key-to-floppy disk
- Key disk to mainframe terminal      • Trends in Computer Data Entry
- Micro-Media systems

This seminar is led by Lawrence Feldman, President of Management Information Corporation, and one of America's leading experts on data entry. All participants will receive a copy of "Data Entry Today", Management Information Corporation's authoritative publication on every aspect of data entry, including a six-month update of this continuing reference service. You should attend this seminar if you are concerned with optimization of your data entry shop, and especially if you are considering keyboard-to-storage systems for advanced time sharing systems. Cost for the 3 1/2 day seminar is \$350, including continental breakfasts, luncheons, and all course materials. Additional registrants from the same company are charged only \$300.

New York      Waldorf Astoria  
Chicago      Hyatt Regency O'Hare

April 21-23  
June 9-11

## Data Base Design

### A practical approach to the design, implementation, and maintenance of data base systems.

Effective data base system design requires both a complete knowledge of the facilities provided by a data base package, and a basic understanding of the mechanisms which can be employed in data base design. In fact, the former is of questionable value without the latter.

This course is a packed, independent examination of the techniques required for the design of effective data base systems. The topics covered include:

- Effective Record Design
- Physical Storage Techniques
- Optimum File Organization and Indexing Techniques
- File Integrity
- Data from more

Given in association with Leo J. Cohen and Performance Development Corporation, this course reinforces the lecture material with workshops, in which attendees apply the techniques just learned to practical problems.

You should attend this seminar if you are (or will be) involved in the design and/or implementation of a data base system and whether as a Data Base Designer, Planner or Analyst.

This course runs for 3 days and costs \$350, including course materials, continental breakfasts and luncheons. Additional registrants from the same company qualify for a reduced rate of \$300. Current schedule:

Chicago      Sheraton O'Hare Motel      May 12-14  
New York      The Plaza      June 2-4

## Performance Evaluation and Improvement

### A seminar actually designed to save your installation money.

This course starts with a discussion of questions and specific problems attendees have about system performance at their own installation. Then step by step each attendee will learn the methodology necessary to understand the problems and implement the answers. The techniques presented at this seminar are in effect at numerous installations today, and have extended the life of over \$1,500 for more than two years - as savings, at last estimate, of more than \$700,000 for one user.

Our course leader is Saul Steinberg. His book, *Data Processing Systems: Their performance, evaluation, measurement, and improvement*, will be an important part of the seminar. As an aid as case studies, books will be provided for each participant.

• Computer system performance      • Pencil and paper analysis of a system

• Benchmarking techniques      • Realtime, batch, and interactive time sharing systems

You should attend this seminar if you are a data processing professional or corporate executive whose responsibility it is to plan, benchmark, evaluate, or improve data processing systems.

Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials (including a copy of Saul Steinberg's book on the subject) is only \$250.

Current schedule:

New York      Waldorf-Astoria      May 5-6

**FIRST TIME!**

 **COMPUTERWORLD**

To: Ed Brides, Vice President, Editorial Services, Computerworld  
797 Washington Street, Newton, Mass. 02160

Please send me a brochure and registration form for the following seminar(s):

Title \_\_\_\_\_

City in which you would  
probably attend:

Many of our seminars are available for private, in-house use at a greatly reduced per-attendance rate. For full information on bringing any seminar to your facility, check here.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_

**NOTE: If time is short, you may reserve space at any seminar by calling collect. Call Miriam Ober at (617) 965-5800.**

# Dear Computerworld

Let's get started.

- PROUD
- CURIOUS
- SKEPTICAL
- EXCITED
- ANGRY
- DEMANDING
- PLEASED
- FURIOUS
- INVOLVED
- INFORMED
- AWARE
- SURPRISED

ALL OF THE ABOVE

I'm already a subscriber,  
but I'd like you to  
change my:

address  
 title  
 industry  
 other

My current mailing label is attached  
and I've filled in new information  
on the other side.

Please fill out form on back,  
detach and insert in post-  
paid envelope attached  
through binding.  
Thank you.



COMPUTERWORLD



RATES U.S. \$12 Canadian and PLAS \$20 Other foreign \$36

If charge, we must have cardholder's signature

10.  Manager of Computer or Data Processing Department  
10.  Manager of Computer or Data Processing Department  
20.  Data Service Bureau Software Planning Consulting  
40.  Financial Analyst  
50.  Financial Analyst  
60.  Financial Manager Real Estate, Relating  
70.  Business Service Dept. Off.  
80.  Guidance and Counseling  
90.  Guidance and Counseling  
90.  Purchasing Purchasing Other Communication Service  
92.  Other

11.  President Owner Partner General Manager  
12.  Vice President Manager Finance Officer  
12.  Director Manager of Operation Planning  
21.  Adminstrative Services Supervisor Sp  
22.  Systems Manager Systems Analysis  
23.  Project Manager Project Management  
32.  Program Manager Manager Project  
41.  Application Engineer  
42.  Quality Control Manager  
51.  Marketing Sales Representative  
52.  Other Sales Marketing  
60.  Computer Sales  
70.  Lawyer Attorney  
80.  Librarian Educator Student  
88.  Other

Address shown is		<input type="checkbox"/> Check here if you do not want to receive promotional mail from Computerworld	
<input type="checkbox"/> Business	<input type="checkbox"/> Home	<input type="checkbox"/> Other	
City	State	Zip Code	
Company	Name		
Phone	Address		
Address	Address		
City	City		



Detach here, fold, and place in post-paid envelope attached through binding.

## 'Audit/5' Watches Utilization, Cost Factors of CICS Resources

SACRAMENTO, Calif. — Audit/5 from Software Management Inc. offers on-line statistics and cost allocation system designed for installations operating under IBM's Customer Information Control System (CICS). It can be used with all versions of CICS except DOS/Entry, the vendor noted.

Developed by On-Line Software International, Audit/5 gathers statistics about communications line utilization, transaction file utilization and terminal connect time.

Terminal activity, program activity and program logic paths used are also documented, SMM said.

### NCR-Based 'Labeller' Is Load/Go Package

AUBURN HEIGHTS, Minn. — Users of NCR Century CPU can access any standard disk files and print mailing labels from them in a variety of layouts, from 1-to-4-up, with parameter card entries and the Labeller package from L/V Associates.

Preparation of the English language control card entries does not require DP experience, the firm stressed, and changes can be made dynamically since the package provides a generalized load-and-go approach to the label preparation problem.

Labeller prints user-specified fields from files anywhere on the label or print line, but also has the capability to print as many as seven different constants on seven different lines.

In addition to supporting various forms of input, Labeller provides several choices for output. The user may, for example, print a specified number of labels, regardless of how many records are in the file, or the system can be set to print every Nth record.

The program requires 14K of memory and can be used on any NCR Century CPU. It is available now for \$300 from L/V Associates through P.O. Box 4175, 48075.

### Remote System Backs Inventory, Cash Flow

(Continued from Page 14) favored the separate companies. Refrigeration equipment is going to a single account for the system," he said.

Daniel W. Judge, administrative vice-president of Ward Brothers Mill Supply Co., Inc., an industrial distribution firm in Lockport, N.Y., reported his company was able to realize a 15% reduction in inventories within the last year.

"We studied our single-product line in our inventory," Judge said, "and we eliminated one line entirely because we learned it was not selling effectively."

Judge also said the cash flow resulting from a decrease in inventory helped the firm in buying a new branch and in retaining its headquarters office. "We wouldn't have been able to do any of this without the computerized reports," he said.

A 50% reduction of nonmoving stock within the last year through use of computer reports is reported by Robert L. Lewis, director of inventory and purchasing at Capitol Plumbing & Heating Supply Co., a plumbing/heating/waterworks distributor in Springfield, Ill.

He told the seminar his firm's use of the inventory reports is valuable for providing the money for use in expansion programs. "With our four branches, we've been able to use the money we had invested in dead inventory to reduce the money we would have had to borrow to expand," he said.

"And with the prime interest rate being as high as it is today, that sum is very significant."

The package can also be used for obtaining accounting information about internal CICS transactions. Data collected could serve as a base for billing end-user organizations, a spokesman suggested.

Audit/5 reports provide information for tuning CICS, restructuring logic paths and determining areas of high activity.

Requests for standard reports and cost analysis for the various CICS entities are entered through control cards. The package also has a facility for creating reports formatted to user specifications.

The data gathering portion of Audit/5 can be initiated from any supervisory terminal and the reporting portion is executable under either DOS or OS as a batch program, requiring 20K plus space for access methods and sort routines.

Source code (ANS Cobol) and installation instructions are available for \$400 from SMM at 1007 Seventh St., 95814.

EMERYVILLE, Calif. — Maxima Systems Group has developed Maxi-Lite, a program library maintenance and protection system that is said to have several advantages over previously available library packages.

Operating on IBM 360 and 370 mainframes, the system captures 80-column card images on one or more highly compressed Basic Direct Access Method (Bdam) file libraries.

The compression is accomplished by stripping all blanks, escape numbers and program identification from the original card formats, Maxi-Lite explained.

Maxi-Lite controls source code, object code, Job Control Language (JCL) procedures and data. Cobol becomes part of an audit trail which, when used in conjunction with file backup routines and passwords, makes the system part of a total security approach, the firm added.

The package supports tabular key-

word compression for as many as 128 keywords, compressing each into two bytes. INCLUDES, nested through as many as seven levels, are useful to Cobol and PL/I programmers and to systems planners working with JCL programs.

Cobol shorthand is part of the standard Maxi-Lite package, easing both the source code storage requirements and the programmers' original coding effort. The system expands the abbreviated codes to full Cobol statements at compile time.

Since Maxi-Lite does scan-update-delete-repeat types of operations, simplify control card usage and reduce overlay operations of the maintenance programs, a spokesman added.

Maxi-Lite will fit in a 32K byte DOS partition but can be used on OS as well. The package is now available for \$2,227 under perpetual license, or \$119/mo for DOS. The OS prices are \$2,662 or \$148/mo. Maxima is at 1475 Powell St., 94608.

## Librarian Runs in 32K

### In Philadelphia, The Smart Money Is On The Smart Terminal:

#### INCOTERM®



The PBW Stock Exchange recently installed America's first automated stock exchange trading system. The entire turnkey package, named Centramart®, was designed by INCOTERM, including the specifications for the mainframe and development of all the associated software.

Centramart is also the means by which the PBW Exchange will tie into a nationwide network for stock reporting and trading. Through that network, the investing public will be able to enter orders for the most favorable execution in any market in the country.

Naturally, INCOTERM Intelligent CRT Terminals are used throughout — to supply current quotations on all PBW listings as well as on the 4,000 companies of the AMEX and the New York Stock Exchange — and to automate all aspects of floor trading, order handling, reporting and clearing of stock transactions.

The system is designed around the minute-by-minute information requirements of the trading specialists. What was the price at the previous trade? In what quantity? What's happening on the various floors?

When a PBW transaction takes place, INCOTERM equipment prints out the associated paperwork. For the seller. And the buyer. And the stock clearing corporation. INCOTERM records the transaction on magnetic tapes for easy processing.



And for transmitting PBW last sale information to the tickertape.

PBW selected INCOTERM for a number of good reasons. Versatility, Efficiency, Imagination, and most of all, for the fact that the INCOTERM gives Centramart the power to remain independent of the national system it will support.

The PBW Exchange looked at the long list of INCOTERM blue chip customers: banks, brokerage houses, hospitals, airlines, manufacturers, and local, state and federal governments. Of all programmable equipment on the market INCOTERM has continually proven to be the best long-term investment.

#### INCOTERM: More Power To Your Terminal.



6 Brattleboro Road  
Natick, Massachusetts 01760  
(617) 665-6100

INCOTERM customer service and sales offices are located in major cities throughout the United States and abroad.

# If you think all disk packs are alike, take a closer look at the BASF 1236.



Because all disk packs conform to certain industry standards, you might think they're all equal. They aren't. The important difference is the extent to which a manufacturer is willing to go in order to exceed industry standards. It's a matter of making a disk pack better than you really need, because there could be times when you need it. Let's look at a few superior points of the BASF 1236 disk pack.

#### The binder that won't quit

As you probably know, magnetic coating doesn't stick to the aluminum disk all by itself. We use a special binding agent to produce an incredibly strong bond. The disk is sealed to prevent oxidation, so you can be sure that the coating won't peel or flake off.

#### Our own coating process

As the trend toward higher packing densities continues, it becomes increasingly important to monitor the thickness of coating deposited on the disk. The problem is compounded by the necessity for progressively varying the coating thickness from the outside toward the inside of the disk, because packing density is greater as the circumference decreases. For those reasons, we've discarded conventional coating methods in favor of an exclusive process using our own BASF-designed equipment.

#### A polished performance

Following the coating operation, we use our own exclusive polishing process to achieve optimum surface regularity. We've been able to achieve a surface so flat that the possibility of a head crash being

caused by uneven disks is completely eliminated. We might mention here that the coating and binder formulation, combined with coating and polishing techniques, all are important factors in achieving surface hardness, which is the ability of the coated surface to survive excessive or extended head loading.

#### Achieving balance

Like any rapidly rotating object, a disk pack will behave strangely if not perfectly balanced. In our precision balancing operation, any weighting required is screwed into place, which eliminates the potential of shifting inherent in a conventional adhesive weighting system.

#### And to make sure...

We test our 1236 disk packs to standards much tighter than those of the leading equipment supplier. If anything unpleasant should happen, we'd much prefer it happen here than on your drive. As a regular procedure, we do scratch tests to check coating thickness, impact tests to determine head crash resistance, detergent tests to check resistance to wear and temperature variations, and drop tests to make sure balance and alignment don't shift during shipment. We test to make sure our 1236 disk packs are error free.

#### Finally

Our 1236 costs no more than other twelve-high disk packs. You're already paying for BASF quality... you might as well have it. For more information on the 1236 or other BASF disk packs or cartridges, write to BASF Systems, Crosby Drive, Bedford, Massachusetts 01730.



You're already paying for BASF quality, you might as well have it.

# COMMUNICATIONS

## Will Make Cost Evaluation Different

# Telenet Packet-Switched Net to Charge by Kilopacket

By Ronald A. Frank  
Of the CW Staff

**WASHINGTON, D.C.** When Telenet Communications Corp. begins packet-switched network operations in June, users will have to evaluate the new type of service by both cost and reliability basis. The most difficult evaluation will come in the cost area because packet-switched data is priced according to a different throughput concept.

The Telenet packet will consist of 128 character blocks, or 1,024 bits, 25 per kilopacket. This price is tentative and could change when the carrier files its first tariff, but even at this rate it will be hard for the data user to relate the packet pricing to existing, known throughput packages.

In order to simplify the process, Telenet has made some typical transmission assumptions to give users a measure of packets that relate to commonly used terminals. An IBM 2780 remote batch terminal transmitting at 400 bit/sec, for example, at a maximum efficiency of 1,200 bit/sec and, with a ratio of four to one, the terminal would transmit about 4,200 packet/hr.

A printer/ERT terminal combination used in an order entry application and transmitting at 2,400 bit/sec would have an average efficiency of 315 bit/sec and would equal 1,400 packet/hr. A Texas Instruments 733 time-sharing terminal with a line speed of 300 bit/sec would have an average efficiency of 37 bit/sec or 700 packet/hr. A 300 bit/sec terminal at 2,400 bit/sec in an order entry environment would have an average efficiency of 50 which translates to 300 packet/hr, according to Telenet.

The least efficient would be point-of-sale terminals used in a retail store under a polled application. If the terminal transmits at 1,200 bit/sec, the efficiency would be only 5 bit/sec or 25 packet/hr.

The efficiency figure quoted for each type of equipment is based on a typical system. The most directly applicable data is for the time-sharing application, since this could be compared with user patterns on the packet-switched Arpanet network, a Telenet spokesman said.

About 12 systems were averaged for the 2780 remote batch terminal entry data was compiled primarily from systems operating in the insurance and manufacturing industries. The smallest sample came in the POS area with less than 12 systems. In all cases, the figures apply to typical terminals and are nevertheless considered adequate for users to figure transmission costs.

A network comparison was made for an order entry system now operating over private lines in 18 multilateral cities with 80,000 peak hour transaction/hr. Current line costs for this type of system

are about \$14,000/mo, Telenet said. If the same net were operating with Telenet service, the line costs would be about \$11,500/mo. In both cases the net would operate at 2,400 bit/sec.

This type of user would also realize a savings in maintenance which would be taken over by Telenet, and reliability would increase from an estimated 4% error rate to 1/2% errors on the line, the company said.

### Network Startup

The carrier expects to begin operations between Boston, New York and Washington in April. Each city will include two Terminal Interface Processors (TIPs) which are modified Prime 200 minis.

The primary network control center to be established in Washington will include Dual Prime 300 minis with four disk and four tape storage units. The center will begin operating in March and will ultimately have the capability of initiating diagnostics at any point in the planned packet-switched network.

### Typical TIP

A typical TIP will handle 64 terminals at 2,400 bit/sec or 200 terminals at 300 bit/sec. The TIP contains about 64K which consists of a terminal interface controller for front-end software; a host interface program to handle mainframes; and an interface message processor which acts as a store and forward program for

The greatest savings for smaller users would see Telenet will be in the hardware area, since this type of company typically will not be able to afford the hardware capital which the packet-switched network provides.

For the larger user, the greatest benefits will lie in the network management savings which this type of company will get



Test message is entered by Cathy Foley into prototype TIP processor that will be operating on the Telenet packet-switched network. Several TIPs are now being tested in local mode at the firm's office.

from packet-switched service, a Telenet spokesman said. The carrier is at 1666 K St., N.W. 20006.

## Controllers in Networks - Part I

# Terminal Management Vital to Successful Systems

By A. Gordon Osborne  
Special to Computerworld

Telecommunications distributes the power of centralized computers to remote users, whether on a real-time basis in which computations are made as inputs are received, or on a batch basis in which computations are scheduled to run on a basic basis.

Estimates of the annual increase of data traffic in the U.S. during recent years approximate 35%, and the trend is expected to continue.

The terminal control unit, or communications controller is a vital link in the process, interfacing remote and local terminals to a computer and relieving the latter of many necessary housekeeping chores which would seriously degrade computer performance.

Lose a communications terminal temporarily and the result probably will not be of serious consequence - but lose a controller and the entire network will be affected. Use a controller to manage remote terminals and future enhancements to a network may be hampered.

Clearly then, shopping for a controller, evaluating the functions available, is a vital part of the entire equipment selection process when adding communications capabilities to computing resources.

### Don't Shop Right Away

Probably the first recommendation to management facing the decision of selecting a controller is "Don't" - that is, until several higher priorities are successfully established.

The needs of remote users - the type of

data required, when it's required, estimates of immediate and future volume of data, etc., are paramount and eventually dictate the type of terminals selected for a network. Choosing a controller without first isolating user requirements could severely restrict the choice of terminals.

For example, if a user's requirements will also preclude selecting inappropriate terminals, it might pay to be leary of slow-speed terminals.

Electric-type terminals which print a speed of 15 char/sec, for example, are 10 times slower than a teletype. A conversion to faster terminals might come sooner than anticipated.

Another critical prerequisite is software. Much of the telecommunications software provided by the manufacturer requires the use of code his own memory. This software may consume an inordinate amount of central processor memory.

Many independent software houses have developed specialized telecommunications expertise; some have experience in the field. These software houses have efficient off-the-shelf, low memory consuming packages which could mean the difference between a fast implementation and a year's delay.

### Operating Features

Assume software and terminals appropriate for the mainframe and teleprocessing needs are chosen. Like most of the network's computer installations that now employ data communications (approximately one-third with an average of approximately 43 terminals each), perhaps not all the terminals will have identical

operating features.

Some, for example, will transmit data at different speeds, while others may not speak the same language, or code, as the mainframe. Herein lies some important considerations when evaluating controllers.

A controller that can recognize and adapt to speeds of transmission, different bit rates, simplifies the use of dissimilar terminals. Without an automatic speed recognition feature, transmission lines must be dedicated to each rate of terminal speed.

With automatic speed recognition, the computer can accept any phone call in a dial-up environment within the range of the speed recognition device.

Code conversion capabilities give the user a wide latitude in selecting terminals. Many IBM terminals, for example, utilize a 7 bit/char. code called Binary Coded Decimal (BCD). Most independent terminals, however, use American Standard Code for Information Interchange (ASCII) code, 8 bit/char. code.

A controller with code convert capabilities bridges this language gap by translating the ASCII generated code into the BCD code set. Thus the user may select terminals from many sources.

The typical BCD controller, the independent terminal, appears like an IBM 2741-type Selectric terminal to a System 370. Standard IBM software supporting the terminal may be used. Yet the user gains a print speed of up to 120 char/sec instead of 15 char/sec.

Additional controller code conversion

(Continued on Page 21)

# MODEM SYSTEM

... with built-in test features to isolate any system failures

The Series 12 Multiple Modem System with more remote line availability than anyone else offers - including a new 1200 baud modem. Expandable from 1 to 120 modems, each with its own power-supply regulator for high reliability. Easily replaced P.C. boards with semi-magnetic capability means you can always upgrade equipment. Get the whole story in our 4-page brochure.

**Anderson Jacobson**  
1065 Morse Ave. • Sunnyvale, CA 94080 • (408) 734-4030

Advertising Dept., Anderson Jacobson  
1065 Morse Ave., Sunnyvale, CA 94086

- Send me the Series 12 Brochure
- Have a salesperson call and tell me more

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone \_\_\_\_\_

# Firm Scraps Teletypes, Cuts Processing Time in Half

MINNEAPOLIS — A major food processing firm here has replaced its remote teletypers with intelligent terminals in an effort to shift the bulk of its customer order processing to the regional sales offices where orders originate.

By scrapping its Model 33 and 35 Teletypes and replacing them with CRTs, General Mills also hoped to save time by increasing transmission speed and to improve the print quality of hard copy reports, Donald Peterson, manager of operations for the company's DP department, said.

Such hopes have been met, then exceeded, officials commented.

"We managed to save 50% of the preparation time previously required at field locations for order processing," Roger Weaver, systems operations manager for the company's marketing and sales support group, reported.

"The new terminals are used primarily for order entry," he said, "we want to add control and reporting func-

tions because the system is working so well."

Developed in-house, the product movement system depends on some 34 Data-point 2200s installed in 21 regional sales offices, six mills and two plants (in April,

teleprinters due to format errors during input and an occasional misplaced character in output received by the remote locations.

"With the CRT terminals, the error rate has dropped to less than 1%, and any

processor via dial-up lines and Data-point's Comm-Adapter, which combines a 2200-402 communications adapter with a Bell 202 modem.

Batchs of order information are sent to the company's Burroughs 86700, which is dedicated to production. A few Data-point terminals are also connected to a second 86700, but this mainframe is devoted to coding and application development, Peterson said.

The 86700 is programmed to perform addition error checks and, if the required conditions are not met, the machine signals the need for retransmission of order information.

Peterson commented that once orders are prepared, Minneapolis sends loading order, bills of lading and inventory counts to shipping points, including plants, mills and distribution centers. When orders are filled and shipped to customers, notification is transmitted to the Minneapolis center where inventory is adjusted and the order is marked as completed. The center then transmits shipment advisory memoranda back to the appropriate regional sales office for customer record control, Peterson said.

## Satisfied With Service

General Mills has been generally satisfied with the service support received from Datapoint Corp., Peterson remarked. But service support does vary geographically, depending on where the vendor has a customer base established, he said.

"Some of our mills are out in the cornfields, and delays have resulted when Datapoint has had to fly service people into the area," he explained.

While he would like to see this aspect of support improved, Peterson added, he has no major complaints with the vendor's service efforts on General Mills' behalf.

The food processing firm originally went with the 2200s because they are fully programmable and can be upgraded to faster speeds, O'Toole said. "At the time, we anticipated going to 1,800 bit/sec, although such speed doesn't seem possible now."

In addition, the devices operate in asynchronous mode. O'Toole noted the company also evaluated Sycor and IBM terminals, but discovered their asynchronous transmission didn't interface well with Burroughs equipment.

General Mills eventually plans to shift more of its payroll processing to the remote locations. The terminals will receive data in batches and, as in the case of the 86700, perform payroll checks and other required documents, Peterson said.

The company also expects to acquire more terminals for its distribution centers and food packaging plants. Because the applications of these locations are more inventory control-oriented, however, the devices will have to have higher printing speeds and a disk storage capacity.

## GDC Modem Operates Over Private Lines

WILTON, Conn. — General Datcomm Industries, Inc. (GDC) has a synchronous, binary, serial 4,800 bit/sec modem designed to operate over Bell-conditioned 4-wire Tymnet private data lines. It is fully compatible with the 208A data set.

The GDC 208A is solid-state and features a startup time of 50 msec with automatic adaptive equalization.

Designed for continuous carrier or controlled carrier applications, full or half duplex, the GDC 208A can be used in multipoint polling applications.

The 208A switches from "request to send" to "clear to send" in less than 50 msec in controlled carrier operation, the firm said.

Price of the GDC 208A is \$3,600 with delivery in 30 to 60 days from 131 Danbury Rd., 06897.

## Terminal Transactions

Peterson explained. Each CRT includes an 8K memory, a 30 char/sec serial printer and a programmable communications adapter.

As operators key orders into the terminal, the device automatically subjects the data to various levels of verification. If an operator enters an illogical code, the 2200 signals the error and the terminal continues to perform error detection routines on the data, notifying the operator of any necessary corrections.

At intervals during the day, under operator command, the terminals link the remote locations to the Minneapolis com-

corrections can be made much more rapidly," he said.

When satisfied with an entered order, the operator signals the end of the message and both the variable and the fixed-format data shown on the display screen are stored on tape cassette. Peterson noted that during the day, the terminal continues to perform error detection routines on the data, notifying the operator of any necessary corrections.

At intervals during the day, under operator command, the terminals link the remote locations to the Minneapolis com-

# 3330 plug-compatible disk drives from Randolph

**RCC/7330 disk drives provide IBM S/360 and IBM S/370 users with high performance at savings of 30% or more**

Over eight thousand Model 7330 disk drives are running round-the-clock on IBM 360/50 and S/370s throughout the U.S. They match the performance of IBM 3330 disk drives in every vital comparison except one—price.

The RCC/7330 disk drives offer Randolph customers savings of 30% or more, and you still get the same Storage Capacity of 100 million bytes per spindle. Transfer Rate of 800,000 bytes per second and Error Correction with automatic detection and parity.

### RCC/7380 Storage Control Unit—key to high performance at low cost

Plug-in-plug compatible with IBM's 3300 or S/370. Connects to S/360/50 and S/370 via a selector channel. Provides for control of one to sixty-four RCC/7330 disk drives, permitting incremental storage additions of 100 million bytes up to a 6.4 billion byte system. Dual port capability offers substantial advantages over string-switching to the multiple CPU and/or controller user by allowing simultaneous access to spindles in any system.

### RCC/7330 uses IBM 3336 or equivalent disk packs

Each pack is interchangeable with any RCC/7330 or IBM 3330 drive. Provides incremental disk storage. The twentieth disk surface is used to control servo-seeking, track following, rotation-position sensing, and data clocking.

**Do you have an IBM S/360/50, 65 or S/370?**  
Your distributor or a Miehler can show you how to expand your EDP operation—and reduce your costs—with a Randolph lease program tailored to your specific CPU and disk storage requirements.

**VISIT OUR BOOTH IN THE COMPUTER CARAVAN '75.**



**RANDOLPH COMPUTER COMPANY**  
8037 SITE AMBROSE ROAD/GREENWICH, CT 06830



## An Introduction to the Lingo

Print speed conventionally is referred to in char/sec, presumably because the end result appears in alpha or numeric characters.

The term "byte" refers to a unit of information operated on in a computing system. It is also used to refer to a character and, in addition, can describe a specific instruction or memory or address.

Transmission speeds traditionally are stated in bit/sec. The bit terminology is more useful when talking transmission speeds because different codes employ different numbers of bits to represent a character.

Seven bits, for example, comprise a character in the Binary Coded Decimal (BCD), whereas an 8-bit code represents a character in ASCII code.

A bit refers to a pulse transmitted along a wire. Its position in a coded stream of a character is represented by a 1 (bit) or zero (no bit), the presence

or lack of a signal. In BCD the letter "A," for example, is represented as follows:



"Baud," a byproduct of the telegraph, may or may not equal the number of bit/sec transmitted. The term refers to the signaling speed of a transmission line, the number of times a signal changes in one second.

In asynchronous transmission baud rates and bit rates are usually the same, a baud equalling a bit.

With phase modulation, however, which is often adapted in synchronous transmission, a baud may be broken into sections, where a baud may equal two and sometimes four bits.

The easiest way to handle a baud dropper is to tell him to talk in bits.

## Controller Vital Key To Systems' Success

*(Continued from Page 19)*

capabilities, depending upon terminal characteristics, may be utilized to convert ASCII-generated codes to other codes, such as Extended Binary Coded Decimal (EBCD) Correspondence Code terminals (used in textual applications) and Extended Binary-Coded Decimal Interchange Code (EBCDIC).

### Consider the Support

Some mainframe manufacturers will support, software-wise, only their newer terminals and their newer controllers. This saves the manufacturer programming dollars and possibly upgrades its terminal population.

Thus, to continue using an older but satisfactory terminal could require using an older controller which may, for capacity, not be used.

In addition to speed and code, terminals are classified as either synchronous or asynchronous: The distinction applies to the mode in which a terminal handles bits.

Asynchronous terminals require start/stop bits immediately preceding and following a string of bits to identify those bits representing a character. Synchronous terminals contain extra circuitry instead of sensing start/stop bits to perform this character identification.

Asynchronous transmission only is referred to as start-stop transmission. Synchronous transmission, devoid of start/stop bits, is more efficient and faster. Controllers which support both modes of transmission should use a mix of terminals involve both modes.

*Osborne is product marketing manager for communications equipment at Memorex Corp.*

## Users in Eight Cities Can Get Calcomp VTS in 90 Days

ANAHEIM, Calif. — California Computer Products, Inc. (Calcomp) has announced its Virtual Terminal System (VTS) is available for delivery 90 days after receipt of order in eight cities: New York, Washington, D.C., Boston, Chicago, Philadelphia, Houston, Los Angeles and San Francisco.

VTS, which is manufactured by the Braegen Corp., a Calcomp subsidiary, consists of an intelligence module (containing up to 16 terminals) and peripherals (the basic configuration expandable to 60 terminals) and various peripherals.

It is said to satisfy a broad range of data communications requirements for IBM 360 and 370 users.

Calcomp is at 2411 West La Palma Ave., 92801.

## AVAILABLE FOR LEASE

370/158 April

370/155 March

370/135 March

### IBM 370 REMARKETING

CBA will assist in replacing your equipment by:

- Underwriting the remarketing of owned or leased systems
- Leasing your follow-on system
- Documenting the complete transaction so as to protect against depreciation recapture and/or ITC giveback

Contact Ed Harnett for further information

**Computer Systems  
of America, Inc.**

141 Milk Street, Boston, Mass. 02109

(617) 482-4671

IF YOU LIKED STRUCTURED PROGRAMMING,

YOU'LL LOVE

## STRUCTURED DESIGN

Structured design is a new and highly disciplined form of modular design—a concept that can be applied to both software and hardware design. It is based on original research carried out at IBM's 66th Research Laboratory in Constantine, a YOUNDON Inc. staff instructor, the theory was further refined during Mr. Constantine's tenure at IBM's System Research Institute in 1968-72; the major results of that work were published in a paper by Constantine, Myers and Stevens in the spring 1974 issue of the *IBM Systems Journal*.

The major objective of structured design is to divide a system or a program into pieces in such a way that individual pieces can be considered, implemented, fixed or changed without affecting the rest of the system. In order to evaluate various alternative designs that may evolve during the attempt to reach this objective, we explore the *connections and relationships* between modules. Two of the concepts that are used to describe inter-module relationships are *coupling* and *cohesion*. In order to achieve the ultimate goal of a "coupled" system, we want to have the smallest possible number of interconnections between modules, as well as connections that do not strongly "couple" one module to another. Coupling is a measure of the strength of association established by a connection from one module to another; the extent of coupling depends on how complicated the connection is, whether the connection refers to the module itself or something inside it, and what is being sent—data or control. The seminar explores various types of coupling, and provides strategies for minimizing inter-module coupling.

Structured design also achieves its goal by *maximizing the relationship among elements* (e.g., sub-modules and/or instructions) that are in the same module; the intention here is to ensure that those elements that are grouped into a

module; the intention here is to ensure that those elements that are grouped into a module by the program designer really deserve to be in a module. This introduces the notions of "cohesiveness" and "binding"; a system whose modules are highly cohesive will tend to be simpler and easier to maintain. The seminar discusses six levels of cohesiveness, gives examples of each, and provides the programmer with guidelines for achieving the desirable level of functional binding.

Several additional concepts and strategies are introduced in the course to further explore the relationship between modules in a large complex program or system. Since most programmers and designers are totally unfamiliar with these concepts at the current time, great care is taken to use a variety of examples and case studies throughout the course to illustrate the concepts.

Structured design is not concerned with programming *per se*, though it is highly compatible with the more widely known concepts of structured programming and top down implementation. Similarly, structured design is not concerned with *per se*, with such documentation techniques as HIPO—or, on the other hand, the structured design seminar describes a form of "structure charts" (similar to, but more formal than HIPO) that can be used to describe progressive levels of design.

**INSTRUCTORS:** Edward Yourdon, President of YOURDON Inc. and Larry Constantine, independent consultant and co-author of the article *Structured Design* (*IBM Systems Journal*, vol. 13, no. 2, 1974).

**FEE:** The fee for this 3-day course, including all course notes and materials, lunch, and a continental breakfast, is \$395.

**DATES:** March 24-26 Washington, D.C.  
May 12-14 San Francisco

## YOURDON Inc.

575 Madison Avenue  
New York, N.Y. 10022  
(212) 488-1757

please put me on your mailing list  send me more details on your public training courses  contact me regarding inhouse presentations on your courses

Name: \_\_\_\_\_  
Company: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone: \_\_\_\_\_

# Yes.

If you can answer "yes" to this question, we'll send you a free metric/inch converter.

Does your company purchase minicomputer/miniperipheral hardware and add value to produce a system for resale?

Computerworld is engaged in a research project on Systems Houses, and if your company can answer yes to that question, we'd like to know a little more about you. In return, we'll send you a 3" x 8" metric/inch slide rule converter. It's compact, sturdy and very useful—with 15 different conversion tables built in. To get it, just fill out the coupon and send it along to the address indicated.

Thank you very much.

To: Jack Edmonson  
Market Research Dept.  
Computerworld  
797 Washington Street  
Newton, Mass. 02160

Yes, my company does purchase minicomputer/miniperipheral hardware and add value to produce a system for resale, and I'd be willing to spend a few minutes with your questionnaire. Please send it along with my metric/inch converter.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

 COMPUTERWORLD

## Adds Introduces MRD 980 CRT, TTY Replacement

HAUPPAUGE, N.Y. — Applied Digital Data Systems, Inc. (Adds) has introduced an addition to its line of CRT terminals. Called the MRD 980, the terminal is a CRT-based, portable and is a rack-mounted version of the earlier Consul 980.

Among the features standard on the terminal are upper/lower case display, extensive operator controls, a graphics capability and various peripherals and communication line interfaces, Adds said.

The terminal can display formats consisting of fixed data, displayed as a series of characters the operator can then fill in the banks with variable data, displayed as black characters.

The MRD 980 has an audible alarm to notify the terminal operator of an error or an important message. It also allows the CPU to read the current cursor position of the terminal. Delivery of the MRD 980 is 60 days. The price, not including the keyboard and TV monitor, is \$1,995. Adds is at 100 Marcus Blvd., 11787.

## Print, Plot Options Available for GS1-300

FORTRESS CITY, Calif. — Gencom Systems, Inc. (GS1) has added two print spacing and plotting options to its GS1-300 terminal.

Half-line Option is a composite of such features as half-line feed, half reverse line feed, superscript and subscript.

Two-color ribbons are supported and there is a perforation skip feature. GS1 says its spacing with Super Option is under complete user control from 1/60 of an inch through 7/60 of an inch.

Super Plot enhances the terminal's plotting throughput by as much as a factor of five, the company said.

Super Plot interprets each Ascii character not as a printing character, but as a vector determined by a bit combination of the Ascii character, GS1 noted.

When an Ascii character is received, the system makes a vector movement before printing a "plotting character" which has been stored into the terminal's memory.

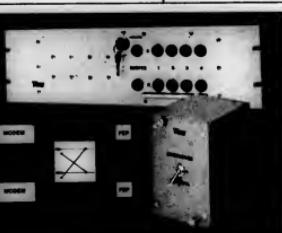
Each option leases at \$15/mo or can be purchased for \$300 from the firm at 1151 Triton Drive, 94404.

**T-BAR Cross Over Switches...  
simple channel interchange  
in a single switch!**

T-Bar Cross Over Switches are available in configurations with 2 and 4 paired channels. They come with three basic controls: Manual, Local Computer and ASCII Unattended Remote, for either rack or wall mounting.

Write or phone today  
for complete literature  
and the T-Bar Communications  
Systems Switching Catalog

**Tbar**  
DATA SYSTEMS DIVISION



# MINIWORLD

## Minibits

### Ampex 16K Add-On Modules

#### Transparent With DG 1200s

REDWOOD CITY, Calif. — Ampex has begun deliveries of 16K add-on memory modules for its current line of Data General (DG) 1200 minicomputers.

The Ampex ARM-1200 modules are said to offer twice the memory on a single board at a cost savings of 20% on memory cost and up to 50% on the memory board cost compared to memory.

Cycle time is 1.200 nsec and access time is 36.0 nsec. Each module is supplied with an address strapping plug used to establish either a single 16K address field or up to four nonsequential 4K address fields for the memory module.

The modules support any memory address field including extensions beyond 32K.

Field support is simplified by uniformity and module-to-module interchangeability within a CPU or between CPUs, according to the company.

The ARM-1200 is priced under \$2,000 from the firm at 401 Broadway, 94065.

### HPU Cuts 21MX Price Tags

CUPERTINO, Calif. — Hewlett-Packard (HP) has reduced prices on its 21MX systems up to 18% by passing on reductions in the prices of its semiconductor memory modules.

The company has dropped the memory module prices by 30%.

The lower prices apply to the 4K and 8K modules of medium-density, 22-pin semiconductor memory. Price of the 4K module has been lowered to \$900 from \$1,300; the 8K module to \$1,500 from \$2,150.

Now 32K of memory can be bought for less than \$4,000, HP said.

"The engineering tests demonstrate a Mean Time Between Failure (MTBF) improvement of 45% and 57% over the HP 2100A core memory machines," HP claimed.

A 32K system has been reduced 18% to \$1,180 from \$14,400; the 16K system 15% to \$7,650 from \$8,950; and the 8K system 10% to \$6,130 from \$6,800.

### APS Module Fits DEC PDP-11s

LIVERMORE, Calif. — Applied Peripheral Systems, Inc. (APS) has released an address select/interrupt control module for the Digital Equipment Corp. PDP-11 series of minicomputers.

Asic-11 is a single-card replacement for the DEC 105 and 107 memory modules but consumes 30% less power, with three times the drive fanout, APS claimed.

Interrupt vector and device register addresses are jumper selectable; DIP switches may be ordered as an option.

Priced at \$150, Asic-11 is available from the firm at 1781 Barcelona St., 94550.

## While Service Bureau Costs Climb

## Firm Comes to Terms With 'Reality'

LEUCADIA, Calif. — Dyna-Med, Inc. (DMI), a manufacturer and distributor of emergency medical care products, recently found the cost of keeping tabs on its inventory with the use of a service bureau was climbing quickly — too quickly. So the firm made an extensive review of its needs and came up with a new solution to its DF needs — a real-time mini-based system.

Dyna-Med serves the rapidly growing paramedical market. The company started in 1964 with a single product and now carries 234 items, ranging from adhesive tape to complete ambulance equipment packages, in its total line.

The need for an inventory control system is crucial in Dyna-Med's method of operation. Most of its sales come from a 12-page catalog, with orders mailed or phoned in.

The customer base includes over 5,500 emergency equipment users, both domestic and foreign. In an average day, about 200 orders are funneled into headquarters, and the need for products is often critical. DMI prides itself in shipping within 24 hours.

### Needed In-House System

To keep a close watch on its inventory — and to keep customers content — Dyna-Med instituted a computerized inventory control program about 18 months ago.

The company has dropped the memory module prices by 30%.

The lower prices apply to the 4K and 8K modules of medium-density, 22-pin semiconductor memory. Price of the 4K module has been lowered to \$900 from \$1,300; the 8K module to \$1,500 from \$2,150.

Now 32K of memory can be bought for less than \$4,000, HP said.

"The engineering tests demonstrate a Mean Time Between Failure (MTBF) improvement of 45% and 57% over the HP 2100A core memory machines," HP claimed.

A 32K system has been reduced 18% to \$1,180 from \$14,400; the 16K system 15% to \$7,650 from \$8,950; and the 8K system 10% to \$6,130 from \$6,800.

### Qantel Low Cost Systems Can Be Field-Upgraded

HAYWARD, Calif. — Qantel Corp.'s 800 and 900 systems are now commercially available. These systems are the least expensive in the Qantel line — the disk-based System 800 sells for less than \$1,000.

The 800 and 900 utilize QIC, the firm's Engle-like application language. Both systems are field-upgradable to larger Qantel systems, and at time of upgrade 100% of the system value is counted toward purchase of program-compatible Qantel systems.

System 800 has, in addition to Qantel's CPU with 4K bytes of user memory, 6.8M characters of disk — half fixed and half removable — and a 45 char/sec keyboard/terminal.

User memory is protected, and the firm's problem-solving package, Solution, is supported.

System 800 has a sale price of \$19,500 and a 66-month lease rate of \$4,000/mo.

System 900, less power, at \$24,500 and based at \$573/mo, provides the same basic user and disk memory, but also includes an auxiliary 45 char/sec printer and a 960-character CRT terminal.

Both systems can accommodate higher speed printers up to 300 line/min; a larger

screen, 1,728-character CRT terminal;

and disk memory expansion up to 12M bytes (half removable and half fixed).

Peripheral devices, including magnetic tape drives and card readers, are available, and data communications capabilities can be added to the system.

Solution is a series of application programs geared specifically to the wholesale distribution industry. The package is priced at \$5,000, with modifications permitted. It is designed to be used on Qantel Systems 800, 900, 1100 and 2000.

Among the accounting and inventory control programs and report capabilities available to wholesale distributors using Solution are:

• Order processing, with automatic extension and verifications of amounts and prices.

• Order printing, including back orders, return orders, picking lists and order summaries.

• Maintenance and inquiry on entire orders and line items within orders.

• Accounts receivable, including invoices, credit and debit memos, summary and back-order registers, cash receipts journals, customer statements, trial balances and aged accounts receivable.

• Accounts payable, including checks,

item cost \$155,000 without a tape drive and \$175,000 with a tape drive, to accommodate the free terminal Dyna-Med required.

Gioibi and Short, who together have 27 years of experience in real-time computers, then considered building their own system from components, but they quickly ruled out this hybrid approach because they felt it would not be immediately productive.

Their next step was to invite vendors to provide an in-depth review of 14 different systems, complete with initial and maintenance costs. The vendors were instructed to provide a configuration based on Dyna-Med's requirements. Gioibi and Short then put the manufacturer's data into a table with 35 points of comparison.

With this table, they could compare systems by point. They soon decided to go with a system based on the Microdata Corp. Iris/4. This system had the main memory capacity they needed for future expansion, multiple program capability and room for CRT expansion.

It cost less than half the original estimates. The \$80,000 Reality system Dyna-Med purchased consisted of a Microdata minicomputer, two disk units, a tape drive, line printer and five CRT terminals.

A key feature is that the Virtual Mem-

(Continued on Page 24)



Qantel System 900

vouchers and payment registers.

- Inventory analysis of quantity on-hand and on order, orders committed and available and recommended returns.
- Sales analysis by item, by salesman and by customer, year-to-date vs. last year; and percentages of profit and sales commissions.
- Payroll, including check printing through the W-2 form, hourly and salaried, plus labor distribution reports and seniority listings; and general ledger.

Qantel is at 3525 Breakwater Ave., 94550.

Managing resources and projects to come in on-time and within budget is a tough goal of the software industry. Often it complicates the situation further. Perhaps this free pocket size reference card will be of value to you! It has helped others, and it's yours with our compliments. It contains the following information:

- System Step Complexity Table
- System Analyst Experience Table
- Programmer Project Knowledge Table
- Programmer Experience Table
- Program Complexity As Shown By Program Function Table
- Program Complexity As Shown By Input/Output Characteristics Table
- Existing Software To Be Used For Another System
- Utility or Package Programs

Please help us complete our survey by answering the following few questions. Thanks.

- 1. Do you have an automated project control system?  
If yes, is it in-house developed, a purchased pkg., or Manufacturer's?  
Yes  No   
Pkg.  Manufacturer
- 2. Do you intend to seriously consider buying a project control system?  
Yes  No
- 3. Your computer type?  
Yes  No
- 4. Your S&P staff size?  
Yes  No

Thanks again, your Project Estimate Guidelines will be sent to you promptly.

Robert F. Wolk, V.P.

**Atlantic Software Inc.**  
5th & Chestnut Sts., Phila., Pa. 19106-215-922-7500

**FREE**  
GUIDELINES  
FOR DEVELOPING  
PROJECT  
ESTIMATES

## User Comes to Terms With 'Reality'

(Continued from Page 23)  
 only Operating System operates through firmware, not main memory, Giobbi stated. With this arrangement, most of the main memory is available to the user for running application programs.

Another mini-based system they had reviewed had 48K bytes of memory, but a full 30K bytes are used by the operating system.

Giobbi stressed that users should emphasize their software development because "this is particularly important in a real-time operation, where a number of people can access the same files at the same time. Here, the software needs more protective coding," he said.

Terminals in Dyna-Med's two-building complex are used for order entry, posting shipping information, accounts receivable, inventories, cash management. Programming, Programming Under Way now includes payables, purchase orders and the firm's general ledger under the guidance of the

### Tape Drives Run In Rugged Areas

PASADENA, Calif. — Data Electronics, Inc. (DEI) has announced three tape drives specifically designed for commercial systems that need reliability and high performance in rugged applications.

The Ansi/Ecma-compatible drives use the 3M DC300A cartridge with 1,600 bit/in. phase-encoding and a transfer rate of 192 kbit/sec.

An integral, direct-current motor/tachometer drives the cartridge assembly.

Interface connections are busied so that up to eight drives can be connected together (a miniature drive select switch is provided). A 3-bit address selects a drive, while a 2-bit address selects a head track.

A variety of options are available: long-life heads (guaranteed to 3,000 hours), integral tape cleaner to enhance error rate performance, and transfer rates of 15 in./sec and 25 in./sec WRITE and bidirectional READ, 120 in./sec bidirectional SEARCH and REWIND and power supply.

Prices start at \$750, with interfaces priced separately, from the firm at 370 N. Halstead St., 91107.

### Micro-Nova Renamed;

### EDS Drops Price \$400

IRVINE, Calif. — Educational Data Systems (EDS) has renamed its Micro-Nova to avoid a conflict with Data General Corp.

Now called the Micro-N, the device is a microprogrammable processor occupying one slot in Data General's Nova or Digital Computer Control's D116 minis and is said to perform any microprogram process in parallel with those minis at higher speed.

EDS also dropped the price of the Micro-N to \$2,200. Four-point decimal arithmetic firmware that occupies 512 words of programmable read-only memory (Prom) sells for \$900 from the firm at 17981 Sky Park Circle, 92707.

firm's two certified public accountants.

Software is designed to direct the operator through the information networks and select the tasks to be performed. The operator logs on to the system by typing in his code. The system asks for the operator's name and the correct entry. A continuing dialog between man and machine eliminates errors by checking every entry and step as it is performed, assuring the accuracy of the data before proceeding.

As soon as the operator logs on, the CRT shows a parent screen listing all the authorized tasks by number. He then types a one- or two-digit number into the system and gets a subscreen, where the information is more

specific. The number for the specific task is the last to be typed.

As the operator works with the system, information on the CRT grows as the operator makes the correct entry. A continuing dialog between man and machine eliminates errors by checking every entry and step as it is performed, assuring the accuracy of the data before proceeding. When an order form is being generated, for example, the operator may make a mistake in the customer's account number. If the number is wrong, the system tells the operator why it rejected the entry and asks for a valid one.

## GSI Terminal Microprogrammable

FOSTER CITY, Calif. — Gencor Systems, Inc. (GSI) has introduced a microprogrammable terminal system with data entry and word-processing capabilities.

Called the System 9000, the product line starts with the Model 9001, a ruggedized CRT with IBM Selectric-style keyboard and numeric pad, microprocessor and 6K bytes of dedicated memory. It is an editing subsystem for either data entry or text-processing applications.

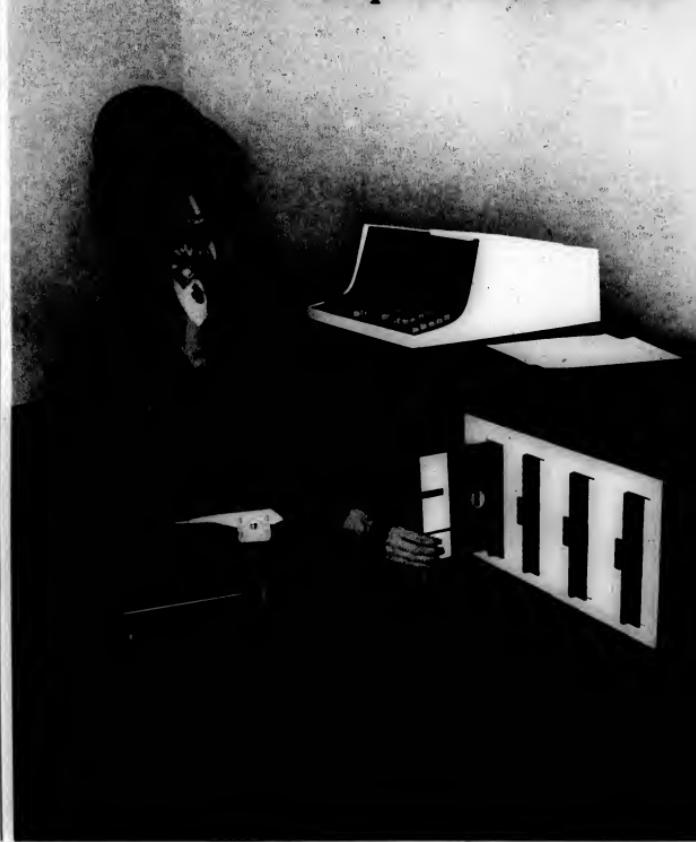
Optional memory is available up to a total of 16K for user program applications. Also available is a second page with scroll and cursor control features.

An extended addressing package and a programmer's interrogation module (PIM) for program development are other options.

System 9000 peripherals include a ready-only printer and a dual floppy disk. With the addition of the dual floppy disk, System 9000 programs may be written, assembled and stored off-line for later execution.

The Model 9002, manufactured for GSI by Zentec, Inc., costs \$2,950 from the firm at 1151 Triton Drive, 94404.

## The Datapoint Diskette 1100-





# What you see and hear at The 1975 Computer Caravan will save you money. And when has there been a better time for that?

## Here are the topics:

### DAY ONE—COMPUTER SYSTEMS MANAGEMENT

Includes four concurrent workshops, each given twice:

- 1 Configuring the Data Center 3 Dedicated Systems
- 2 Performance Measurement 4 Small Centers

### DAY TWO—SOFTWARE

A new topic for a Caravan Forum. Workshops will be on:

- 1 Data Base Management Systems 3 Programming the Small Business System
- 2 Evaluating Applications 4 Utility Software

### DAY THREE—TRENDS AND OPTIONS IN DATA COMMUNICATIONS

Workshops fall into two general categories—equipment and techniques. They include:

- 1 Data Transmission Options 3 Terminals
- 2 Network Management 4 Front-End Processor

### Special Afternoon Sessions will continue to be open to all attendees.

Whether or not you attend the morning Forum program, you'll want to consider the special afternoon sessions. This year's topics are:

Day 1—Professional Development

Day 2—Virtual vs. Real Storage

The daily schedule gives you time to get the information you want.

### FORUMS

9:00 9:45 Introduction and Computerworld Report  
10:00 11:15 Workshops—Phase I  
11:15 11:30 Coffee Break  
11:30 12:45 Workshops Repeated  
1:00 2:00 Luncheons  
2:15 3:00 Wrap-Up Panel

### SPECIAL AFTERNOON SESSIONS

1:30 4:30 Daily (Open to all Caravan attendees)  
EXPOSITION  
First two days—10:00 A.M. to 6:00 P.M.  
Third day—10:00 A.M. to 5:00 P.M.



Sponsored by  
**COMPUTERWORLD**

## FORUM REGISTRATION FORM

Advance Registration is not required for the Exposition.

### Send to:

FRANI BLACKLER

Computer Caravan/75  
797 Washington Street  
Newton, Mass. 02160  
(617) 965-5800

Register me for all three days

1st day

2nd day

3rd day

### Name

### Title

### Company

### Address

### City

**Check Appropriate City:**  Philadelphia  Hartford  New York  Cleveland  Chicago  St. Paul  Seattle  San Francisco

### State

### Zip

Complete 3-day program, includes workshops, luncheon, wrap-up panels, special interest exhibits—plus workbook/notebook. \$90  
Single day program, \$35 (Entitles you to attend all three days of Exhibits and special sessions.)  
Total number of days registered on this form  
Total number of days registered on enclosed form  
Total days registered with this order  
Minimum fee \$35—  
Discount (if you have 3+ forum days, take \$15 discount, 6+ take \$30 discount, and so on...)  
Total due (after multiple day discounts)  
 Check Enclosed  Purchase Order Enclosed

## The Caravan gives you the information you need to increase efficiency and save money.

Change is not new in the computer industry. Information is. And the Computer Users' Forum is the best way to bring together a wide combination of information sources. The User-to-User Forum lets you exchange experiences and share solutions with other users in a series of panels and workshops. And the Exposition gives you information direct from suppliers in an informal, businesslike atmosphere. You can shop around and make comparisons among many suppliers at the same time. And when you're finished, you'll be able to apply this information to your installation. You'll increase efficiency and save money. That's the heart of it. Here are the details:

### The Caravan '75 Exposition features virtually all the elements of a complete system.

This is your chance to find out, first hand, what's new and how it works—in a pleasant, uncrowded exhibit hall. You'll see virtually all the elements of a complete system under one roof—from a variety of America's leading computer companies.

**Here are the companies we'll be keeping:** Modular Computer Systems • NCR Corp. • Digital Equipment Corporation • Anderson, Jacobson, Inc. • Martin Marietta • IBM • Honeywell • Sperry • Tandem • Data General • Prime Computer • Data Machine • Texas Instruments Inc. • Syntex, Inc. • T-Bar, Inc. • Haasline Corporation • Inicom Corp. • Lockheed Electronics Company • Hewlett-Packard • Mini-Computer Systems • Omnitel Corporation • Scope Data, Inc. • American Telephone & Telegraph Co. • Cincos Systems • Datapoint Corporation • General Automation, Inc. • Interdata • Panaphic Corporation • Software International • Control Data Corporation • Cullinan Corporation • Grumman Data Systems • BASF Systems • International Communications Corporation, a Milgo Company • Datavoice • Data General • Delta Data Systems • Computer Devices • Data Computer, Inc. • Cincinnati Milacron • Stromberg Graphix • Consolidated Computer, Inc. • Cooke Engineering Company • Fabs-Tek, Inc. • Randolph Computer Company • Computer Transmission Corporation • Basic Timesharing • Zenex Corporation • Infraex • General DataComm Industries • 3M

### The '75 Forum—new ideas, new subjects.

The 1975 Caravan Forum program includes, for the first time, a whole day's program on Software, one of the most important areas of user interest when it comes to saving money. We've also added workshops specifically designed for smaller centers, and we'll be continuing to cover the important areas of Computer Systems Management and Data Communications—with new information and new techniques.

### It's easy to register for the Caravan.

Just use the form on this page to make your reservations for our Forum program. If you plan to attend the Exposition, no advance registration is required. If you are not a Computerworld subscriber, you may want to write for a free guest ticket to the Exposition. (If you are a subscriber, we should be mailing you a free ticket automatically.) Just send your request to the person shown on the Forum Registration Form. And plan to be there when the Caravan comes to a city near you.

### The '75 Caravan is coming to a city near you. Going your way is our way.

**Phila. March 4-6 (Tue., Wed., Thurs.)** Exposition and Forum: Philadelphia Civic Center (Centennial Exhibition Hall) Ctr. 10th and Market, Philadelphia, Pa. 19107

**Hartford, Mar. 11-13 (Tue., Wed., Thurs.)** Exposition and Forum: (all registration) Hartford Civic Center, 190 Trumbull Street. Forum: Sheraton Hartford Hotel, 196 Trumbull Street.

**N.Y. March 18-20 (Tue., Wed., Thurs.)** Exposition and Forum: New York Coliseum (4th Floor), Columbus Circle.

**Clev. April 1-3 (Tue., Wed., Thurs.)** Exposition and Forum: Cleveland Convention Center, 1220 E. Sixth Street.

**Chicago April 8-10 (Tue., Wed., Thurs.)** Exposition and Forum: McCormick Place, On-The-Lake

**St. Paul April 15-17 (Tue., Wed., Thurs.)** Exposition and Forum: St. Paul Civic Center, I.A. O'Shaughnessy Plaza

**Seattle (Tue., Wed., Thurs.)** April 29-May 1 Exposition and Forum: Seattle Center, 305 Harrison Street.

**San Fran. May 6-8 (Tue., Wed., Thurs.)** Exposition and Forum: Hyatt Regency San Francisco, 5 Embarcadero Center.

### Please circle one number in each category below.

(We must have this information to complete your registration.)

### BUSINESS/INDUSTRY

10 Manufacturer of Computer or DP Hardware/Peripherals

20 Manufacturing (other)

30 DP Service Bureau/Software/Planning/Consulting

40 Public Utility/Communication Systems/

50 Wholesale/Retail Trade

60 Finance/Insurance/Real Estate

70 Manufacturing/Petroleum/Refining

75 Business Service (except DP)

80 Education/Medicine/Law

85 Government/Federal/State/Local

90 Printing/Publishing/Other Commercial Services

95 Other

### TYPE/OCCUPATION/FUNCTION

11 President/Owner/Partner/General Manager

12 VP/Assistant VP

13 Controller/Comptroller/Finance Officer

21 Director/Manager of Operation/Planning/Administrative Service

22 Director/Manager of Supervision/DP

23 Manager/Supervisor/Systems Analyst

31 Manager/Supervisor Programming

32 Programmer/Methods Analyst

41 Computer Engineer

42 Other Engineering

51 Mgr Sales Representative

52 Sales Marketing Consultant

70 Lawyer/Accountant

80 Librarian/Educator/Student

90 Other



## Automatic Tape Unit Saves Users' Cash

(Continued from Page 27)

The computer-generated molding schedule is broken down by component, core assembly and core-making requirements. Perpetual reworking of the schedule each night is used to predict the day's production and determine how best to meet the changing business needs of the tractor works.

Rescheduling, in turn, relies on accurate reporting of the work in process and finished work at each of 40 workstations, 15 shifts per week.

The foundry master files or data base, then, consist of routing and engineering details covering some 500 cores and 100 different kinds of castings.

### Establishes Priorities

The computer system prepares order evaluations and establishes the sequence of production for each order scheduled. Lot sizes are determined by the break-even point between casting cost and set-up costs, accounting for expenses in storage and movement.

Run sizes are determined by the economics of the foundry and inventory handling processes.

Considering scrap and storage factors, the computer also assigns priorities to the runs, insuring that the castings needed are

### CDC 6400 Helps Ariz. Star Gazers Capture Details

TUCSON — With a "computer-enhanced photographic" technique three astronomers at the Kitt Peak National Observatory have produced the first pictures of a star that show some surface detail.

Previous efforts were too distant to distinguish anything but a pinpoint of light.

Roger Lynds, Jack Harvey and Peter Worden applied a technique known as "speckle" photography to photograph Betelgeuse, a giant star almost as large as Earth's solar system. They took 40 pictures of the star through a telescope, exposing each plate for less than 1/100 of a second.

The short exposure divided the telescope's mirror into a number of smaller lenses, making not one image but many — from 100 to 500 for each picture, the researchers said.

Each of these specks contained different information; to analyze and combine them, a high-speed scanning beam that can detect minute differences of light intensity was used to swap the speck.

The data was then fed into a Control Data Corp. 6400 where Fourier transform processing was used to break up each signal and display it in terms of frequency. The signals were then arranged into a composite photograph depicting a single stellar image.

The photograph of Betelgeuse was only 2-1/2 inches in diameter, but it failed enough to show faint markings which are believed to be hot spots in its atmosphere.

Lynds said the biggest problem with the system at present is that it's very expensive in terms of computer time. Processing each photo took about an hour.

produced on time.

Data entered at the exit point from each major step in the foundry process is captured and stored by the 1800. Perpetual inventories and production data are used to keep track of cores, core assemblies and castings. These records are transferred each night prior to the scheduling run for the following day to the 370s.

Each foundry employee knows what his day's work plan is by the specifications and routing information produced as by-products of the forecasting process. The printed records are held "in suspense" by the computer and,

when actual production and movement are reported, it enters what really happened, compares it against plan and adjusts the next day's schedule accordingly. Inspectors update the computer with the status of any castings scrapped as well as those passed and released for finishing.

Approved and inspected castings are retained in the finished casting inventory until the final inspection is entered. This is done when the casting is palletized and shipped to the factory. Scrapped castings reenter the melt process and data on them is reentered into the production scheduling loop.

## BSI Adds Magnetic Tape Option

SUNNYVALE, Calif. — Basic Timesharing, Inc. has a magnetic tape option for its 4000 and 3000 series of interactive timesharing systems.

The magnetic tape option permits on-line dumping of disk files to magnetic tape and on-line loading of magnetic tape files to disk files.

Uses of the magnetic tape option include transfer of file data between a Basic Timesharing system and any other system using standard industry recording format and easy removal of inactive files from on-line disk storage to magnetic tape.

The magnetic tape option operates in industry-compatible, 9-channel format at both 800 bit/in. and 1,600 bit/in. density.

The magnetic tape option, consisting of a Model 4300 magnetic tape controller and Model 4350 magnetic tape unit, is priced at \$12,500. The firm is at 650 N. Mary Ave., 94086.



## All in a Day's Work for Multiprocessor

# 'Impartial' Party Assigns Moose Hunting Permits

QUEBEC CITY — Moose hunting here is so popular the provincial government's central service bureaus uses a computer system to randomly assign 1,250 permits each spring.

"We have different quotas for hunters in the different parks and reserves of the province," according to Andre Gariépy, director of the service bureau, Centre de Traitement Electronique des Données (CTED).

"Certain parks may permit only 200 moose hunters and

others as many as 1,000. We simply gave the job to the computer," a Univac 1106 multiprocessor.

The computerized drawing is open to the public, Gariépy said, so any interested person can see it's completely impartial. Officials of CTED and the Department of Tourism, Fish and Game are in attendance.

The provincial government uses a combination of departmentally operated computer centers plus

CTED for its DP.

CTED's 1106 currently handles about 140 projects for 22 departments, using some 3,000 programs and printing as many as 50 million lines of information/mo.

### Minimum Disruption

CTED converted to the 1106 from two IBM 360/50 computers with a minimum disruption in data processing activity.

The 1106 was installed in March 1973, and the bulk of the former programs were converted

by December 1973.

About 10 programmers plus 15 Univac specialists worked on the conversion of some 2,500 programs used by the previous computers.

The effort also entailed converting about 12,000 tape reels and retraining 200 DP staffers.

CTED's staff includes 45 systems analysts who design programs and write specifications, and 40 programmers who write an average of 150 to 200 programs per month.

The 1106 includes a 265K memory and runs under the Exec 8 operating system. Records are kept on 10 Univac 8440 disk subsystems, one Univac 8460 disk subsystem, and 12 Uniservo 16 magnetic tape units.

The computer usually handles about eight batch jobs simultaneously while servicing 24 Uniscope 100 CRTs and a remote job entry network of seven terminals located within the Quebec government.

"Ease of operation was a prime consideration in choosing the 1106 for such a large volume of work. We didn't want a complicated system where you need engineers to run computers," Gariépy said.

"We weighed the pros and cons and found the savings would make conversion worthwhile from a price/performance standpoint. We have easily doubled our capacity without disturbing our regular operation," he added.

"With our volume, we must get programs in and out of the computer without delay, otherwise we drown," said St-Laurant, assistant manager of operations.

CTED actually operates as a service center for the provincial government. The center belongs to the finance department, billing other departments according to the work which it handles.

The 1106 performs calculations from source documents which are picked up by truck each day from other departments in Quebec or mailed from more distant locations and then keypunched. The card data updates such records as payroll for 10,000 employees, payments to vendors.

Other jobs for the Tourism, Fish and Game Department include keeping statistics on the spending and size of purchases in the parks and reserves of the provincial parks, controlling prices charged by innkeepers and landlords, supervising the quality of service, issuing operational permits and maintaining the index of hotels.

For the agriculture department, the 1106 keeps statistics on results of artificial insemination of cattle, analyzing the quality and growth of descendants by breed of cattle. It also keeps records of cattle quality and quality standards for purbred pigs, provides schedules for optimum feeding of milk cattle, maintains data on agricultural production and oversees quality control for each product.

Other applications include marriage and tourist surveys, statistics on land surveys, administering alimony deposits, managing insurance policy records, calculating municipal debts, producing and maintaining the government telephone directory.

CTED also keeps records of products offered to the government by different suppliers and of government purchases.

CTED's programmers are organized into teams of about eight persons for specific jobs. When a programmer completes one phase of an assignment, this is recorded on the computer, which can tell how the exact time of each program and the time expended on each phase.

# OUR SURPRISE PACKAGE.

**The MODCOMP II  
Communications Processor.**

■ IMMEDIATE DELIVERY ■ LEASING ■ MAINTENANCE ■

## DATA TERMINALS INTERNATIONAL COMPUTER EQUIPMENT, INC.

- TEXAS INSTRUMENTS 725 & 735 Portables—733 KSR & ASR
- DECWriter ■ DIABLO HyType Impact Printers
- CRT Terminals—ADDS 580 & 580—Lear Siegler ADM 1 & ADM 2
- Datapoint 2200 -- and Disk Systems—Printers—Communications Standard & CUSTOM Software
- COMPLETE financial & accounting System
- USED Beehive CRT's—TI 725's—Techrons—and others

### CALL or WRITE ICE at:

SAN FRANCISCO  
(415) 563-7005  
2200 24th St., S.F., Ca. 94123

LOS ANGELES  
(310) 654-2001  
11222 La Cienega  
L.A., Ca. 90034

CHICAGO  
(312) 654-3777  
3465 Des Plaines Ave.  
Des Plaines, Ill. 60015

## Program to Rank Tennis Players May Eliminate Cries of 'Foul'

NEW YORK — Who's the nation's best tennis player—the consistent winner who beats almost everyone or the less steady player who conquers him in head-to-head matches?

Questions like this have confronted the ranking committee of the United States Lawn Tennis Association (USTLA) over the past 93 years. Early in 1976, though, a computer program will replace the committee in choosing the best players.

One reason for the change is that the committee must make a difficult decision to rank Jimmy Connors and Stan Smith as No. 1. Neither player was happy with the result, which probably would have been different had the committee used a computer program, Leslie Jenkins, a member of the ranking committee, said.

"I think the real interest in the computer system is to develop a selection method involving as little human judgment as possible," he commented.

Accordingly, the program replacing the committee is "strictly an averaging system," that counts on a player's total record," he explained.

Jenkins, an atomic physicist who is also a competitive tennis player, wrote a Fortran program for an IBM 360/75 that produced a set of rankings after the USTLA committee came up with its 1974 list. He found the computerized rankings differed slightly, but not very significantly, from the committee's choices.

### 'More Comprehensive View'

The ranking program can take a more comprehensive view than the committee could, in Jenkins' opinion. The computer calculates the total number of points players earn by advancing to certain rounds in particular tournaments and then divides the total by the number of tournaments entered.

A second part of the algorithm adds up the average achievement points of all the opponents a player has beaten during the year, then divides it by the number of matches he's played.

Players seem to like the idea of the computerized system's approach. Its goal is to serve them better.

The USTLA may also use the ranking program to produce monthly, rather than yearly, rankings. This would help tournament directors in deciding how to seed players in tournaments during the course of the year, noted.

## Researchers Seeking Funds to Automate Sports Injury Data

STATE COLLEGE, Pa. — Pennsylvania State University researchers are collecting a data base on sports injuries, hoping one day to predict how injury rates can be reduced.

So far, the nonprofit National Athletic Injury/Illness Reporting System (Nairs) has been operating without the help of a computer, "eyeballing" data from 15 college and 18 high school teams, Dr. Kenneth S. Clarke, director of the program, said.

Nairs, however, has applied to both the Consumer Product Safety Commission and sporting goods manufacturers for the money to enlarge and computerize its research.

Computer processing, Clarke said, would allow the research group to send periodic statistical and analytical reports back to those who assist us by filling out injury and illness forms."

Currently, high school and college athletic trainers who participate in such studies "see the results in print in three years if they catch the right journals," he stated.

Nairs hopes to involve hundreds of colleges and high schools in its research, Clarke said. Their help would enable the service to establish the precise effect various rules changes have on sports injuries, he added.

The system might also answer what kind of playing surface and football shoes produce the most knee injuries, the most hockey injuries occur and whether suspension helmets or padded helmets are better for preventing head injuries.

With the Penn State program can get enough people participating, we'd be glad to rely on that system to make our decisions," Dave Nelson, secretary of the National College Athletic Association's Football Rules Committee, said. "I think it will work," he added.

If the computerized program reaches maturity, Clarke said it should be able to provide schools and colleges with a statistical injury reporting service for as little as \$50/year.

Reliance Group

Leasco

PUTS IT ALL TOGETHER

BROAD EQUIPMENT SELECTION

EXCEPTIONAL SERVICE

FLEXIBLE FINANCING

Leasco Data Communications

## 500 Times Faster than Previous Methods

# High-Speed Simulation Unveiling Stellar Secrets

PASADENA, Calif. — The secrets of "nuclear cooking" in giant red stars are being uncovered by a Caltech jet Propulsion Laboratory (JPL) scientist here using high-speed computer techniques.

Deep in these giant stars, helium burns violently, erupting in flashes. Astronomers have studied the increasing intensity of the computer system. Dr. Julian Christy-Sackmann, Caltech astrophysicist, has been simulating the chemical changes that occur with each flash at a rate 500 times faster than previously possible.

To obtain what might be called "star profiles," Christy-Sackmann transmits data on each star flash to a Control Data Corp. 7600 located the Uni-

### Recycled Checks Often Rejected, Banker Warns

PITTSBURGH, Pa. — Rising costs of paper, ink and labor are causing some printers to sacrifice quality in check printing, much to the detriment of automatic check processing systems.

That warning was issued by George P. Di Nardo, vice-president of the Mellon Bank, here, and chairman of the American Bankers Association's Operations/Automation Communications, Research and Planning Committee.

Di Nardo reported seven banks have found use of recycled paper and production shortcuts have vastly increased the reject rate of checks processed automatically. Checks printed on recycled paper, according to Di Nardo, are often not readable by machine. In addition, the poor tensile quality of recycled paper causes transport problems, he claimed.

"When you consider that each check goes through an average of 2.3 to 3 banks, alternate processing methods are going to cost a lot more than the cost of assuring the inferior checks," he said.

The Banking Administration Institute is conducting a study of the problem and is expected to issue some recommendations shortly. In the meantime, however, Di Nardo recommended to assure quality control by checking samples in quantity of each check and form manufactured by an outside printer. The samples should be tested on the bank's automated equipment prior to shipment to the customer.

A proposal to certify printers has even been offered as a possible solution to the problem.

versity of California's Lawrence Radiation Laboratory, Berkeley.

The CPU analyzes each flash in less than five minutes, "a saving of 500 times in both time and money, over previous methods," the researcher claimed.

Of the hundreds of successive flashes taking place in a star, previous investigators found it possible to follow and analyze only the first few, depending on the computation time involved, she said. Having looked at 40 flashes during the first year of research,

Christy-Sackmann plans eventually to study hundreds of these chemical changes.

### Role of Helium and Hydrogen

Sponsored by the National Aeronautics and Space Administration (Nasa), Christy-Sackmann's work currently stresses the role convection of helium and hydrogen gases play in stellar interiors.

While each red star flash may produce extreme interior disruption, surface changes in most

cases appear to be comparatively minor, the researcher commented. The release of energy from the interior varies enormously, perhaps due to "convective zones" that seem to come and go," she added.

Christy-Sackmann hopes the project will reveal the nature of the apparent connection between the interior cooking processes and the exterior visible surfaces. The study eventually may help to solve the problem of how stars evolve, she said.

Whatever the flash mechanism, the stellar furnace yields many elements, the researcher added. Atoms of light elements like lithium and of heavy metals like zirconium and yttrium have been found in red stars.

She agrees with other researchers, however, that lithium, the lightest metal known, could ultimately provide the best clue to the interior structure and convective mixing that goes on in giant stars.

# THE ONLY WAY TO COMPARE APPLES & ORANGES



Software makes it no comparison. Especially when you look at the Interdata 7/32 versus the PDP 11/40. Interdata believes that hardware exists to make programming easier. That's the reason we invented a 32-bit minicomputer. And that's the reason there can be no comparison with a 16-bit machine. When you think about it, 32 bits makes it happen. Which means, no matter how you slice it, you get: Unrestricted program size that gives you application programs which are not limited to 65K (16 bits) of memory; Instant disk-to-core loading, dynamic address relocation and task handled traps to assure you of rapid context switching; a Command Substitution System that gives your operator/programmers macro-capabilities making our 7/32, with its multi-task operating system (OS/32MT), simple and easy to use.

Software, that's plain and simply why we made the 7/32 happen — to make your software more efficient and cheaper. So don't try to compare apples (the PDP 11/40) and oranges. Especially when their apple only has 16 bits to help their software and our orange has 32.



Interdata, Inc., Oceanport, NJ 07757. (201) 229-4040.

Gentlemen:

- Maybe there's no way to compare apples and oranges, but I've got to try. Send more information about the 7/32.
- Let's talk oranges. Have an Interdata representative contact me.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone \_\_\_\_\_

This is the Interdata 7/32 minicomputer.



INTERDATA 7/32

A subsidiary of The Perkin-Elmer Corporation  
Oceanport, NJ 07757. (201) 229-4040.

6486 Vincent Road, Mississauga, Ontario,  
Canada L4V 1H3. (416) 677-0990.

1000 Chiswick Park, Chiswick, Middlesex, England.  
Uxbridge UB4 2AA. (081) 8032441.

8032 Graefstraße 10, München,  
West Germany. 8034-20-34-38.

92 Chatswood Street, Leichhardt,  
Sydney, Australia 2065. 439-8400.

### AUSTRALIA

Authentic information is freely available WITHOUT CHARGE from the Australian Embassy in Washington, D.C. (202) 797-3000, and the Australian Consulate General in New York (212) 245-4000, San Francisco (415) 556-3300, Los Angeles (213) 380-4610, Los Angeles (213) 380-4610, and Chicago (312) 320-1740.



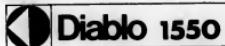
## COMPUTER FINDERS INC.

### 370 Lease Specialists

**(201) 894-0370**



A FINE PRINTER



A VERY FINE TERMINAL

Computrend, the Northeast's leader in New Data Terminals invites you to join us for the first New England showing of the new DIABLO Micro-Processor Driven Terminal.

DIABLO 1550

This latest entry into the Data Terminal market, the 1550, skillfully takes advantage of all the capabilities of DIABLO's unique printer mechanism and combines them with a powerful micro-processor to give the user printing and graphics abilities only available on the 1550. Completes local diagnostics, combined with DIABLO's quality engineering and packaging, assures you the most for your terminal dollar.

TERMINALS ON DISPLAY

- **Diablo 1550**
- **LA 36 - DECwriter II**
- **Texas Instruments, Model 735 portable**
- **Infotron CRT's**
- **Techtron 8400**
- **Data Cassettes**
- **Teletype**
- **Acoustic Coupler**

While attending "The Computer Caravan '75", we invite you to attend a terminal demonstration.

Date: March 11, 12, 13  
Time: 12:00 noon to 7:00 PM  
Place: Presidential Suite  
Sheraton - Hartford

FOR FURTHER INFORMATION CALL:

20 "A" Street, Burlington, MA 01803 (617) 272-8372  
P.O. Box 1101 Middletown, Conn. (203) 632-1643



## Federal Agency Testing Automated Car Diagnosis

How helpful are those automated tests that diagnose a car's problems with electronic equipment? Are they better than a good mechanic? Can they save money?

These are some of the questions the U.S. Department of Transportation expects to answer through a pilot demonstration program launched by the National Highway Safety Transportation Administration (NHSTA).

The program calls for an analysis of car defects and associated repair costs, using data collected by state-operated inspection stations and interviews with as many as 75,000 drivers. Up to 300 pieces of information will be collected on each car.

"This is a consumer program," Dr. Leslie Eder, NHSTA's project manager, said. "Our purpose is to determine the costs and benefits of a diagnostic inspection program to the consumer when inspections are made without any connection to the operation of a repair facility."

NHSTA will conduct the demonstration project through grants to Alabama, Tennessee, Puerto Rico and the District of Columbia. A fifth grant is under discussion with Arizona, Eder said.

**Specially Equipped Stations**

Drivers participating in the project will receive automobile safety inspections at specially equipped diagnostic inspection stations. The intensified check will be incorporated into the regular car inspections drivers in most states must put their car through each year. Each item checked will be entered into a time-shared computer system and a printout made of the car's condition.

Approximately half of the drivers putting through inspection centers will constitute a "treatment group." They will receive a detailed report on vehicle

defects spotted by the electronic diagnostic system.

The balance of the drivers known as the "control group" will only be told their car failed the inspection and needs repairs.

Follow-up interviews will be conducted with all of the drivers when they return to the center for repair of their cars. They will be asked how much repair costs, what defects their mechanics found and related information. This, too, will be entered into the computer system.

By analyzing all of this data, NHSTA will be able to determine the adequacy of the electronic inspection system with the diagnoses of trained mechanics. Maintenance and repair costs of the automobile, the most common types of safety defects and the number of various types of electronic diagnostic equipment will also be evaluated.

NHSTA will use Computer Sciences Corp.'s Infonet network to store and analyze the data, which will be gathered over an 18-month period. The company's \$712,000 contract with NHSTA calls for a final report to the agency in about 30 months.

**Overcoming Two Problems**

The government expects the project to overcome two of the most difficult problems involved in an evaluation of the benefits that might be realized from expanded use of automated inspection systems.

The first problem is how to get accurate information on costs and repair work in such a large-scale operation. Follow-up interviews will take care of that.

The second problem is the lack of knowledge and information about the performance of the many types of diagnostic equipment, their design and ease of use and the training of personnel to operate them. This knowledge gap will be closed by direct participation at inspection centers, as well as comparative analysis of the information collected.

The program will also examine the numbers and types of cars rejected by diagnostic inspection centers.

In addition, information from the program may help to show whether the design of a vehicle aids or hinders the inspection and repair of the many makes of automobiles, Eder said.

Data collected from interviews and the automated inspection centers may also serve as the basis for predictions on the life expectancy of mechanical parts. This will determine which types of mechanical failures are likely to occur in each type of car examined and at what point in the life of the car these failures are likely to appear.

**PRIVACY JOURNAL**

Monthly newsletter on privacy and computers—an indispensable report on new federal and state legislation, court decisions, and the law of privacy, individual anecdotes, computer security, research, and other topics in data systems, cable TV and electronic funds. \$15 per year. Write:

Privacy Journal  
Computer Law Institute  
1200 Connecticut Avenue, N.W.  
Washington, D.C. 20003

# COMPUTER INDUSTRY

## CI Notes

### 1974 DP Balance of Trade Hits Record \$1.98 Billion

WASHINGTON, D.C. — The computer and business equipment industry's positive balance of trade hit a record \$1.98 billion in 1974, running counter to the increasingly negative overall balance of payments.

The country, with \$1,401 billion in 1973, according to figures compiled by the Computer and Business Equipment Manufacturers Association (Chema) from U.S. Department of Commerce data.

Exports of computer and business equipment during 1974 totaled \$3.01 billion, compared with \$2.32 billion last year. Imports also grew, at \$1.03 billion from \$919 million a year ago.

The national trade balance for 1974 was a negative \$3.1 billion compared with a positive \$3.1 billion last year.

During the year, the industry export totaled \$508.7 million, while imports were \$284.4 million, for a positive contribution of \$524.3 million.

#### Adapso to Convene in Mexico

MONTVALE, N.J. — Mexico City is the site of the future of the computer industries, according to the theme for the upcoming 42nd management conference sponsored by the Association of Data Processing Service Organizations, Inc. (Adapso).

Scheduled for April 14-18, the conference will focus on government regulation, unfair competition, industry image building, industry standards, taxation and the industry structure in five, 10 and 15 years.

Tickets, hotel and registration is being handled by Travel Consultants, Inc., 1025 Connecticut Ave. N.W., Washington, D.C. 20036.

#### DG to Close Canadian Plant

HULL, Quebec — Data General Corp. (DG) is closing its Canadian plant, operations here and moving the work to Southboro, Mass. because of high overhead costs and scheduling problems, the firm said.

The plant, which manufactures backplane components for power supplies, employs about 45 people.

DG will maintain its sales and service operations here.

#### Supershorts

Wangco, Inc. has received a contract from Univac for Model U-1200 tape drives valued between \$6 million and \$7 million.

Texel International will market, install and maintain Fabrikate memories in France, Germany, Italy, Switzerland, Belgium and the UK.

**AT LAST—**  
a terminal designed  
for you et al  
[your programmers,  
secretaries, typists,  
operators, etc.]

### Delays Invite Speculation

## Will U.S., IBM Settle Before Court Date?

By E. Drake Lundell Jr.  
Of the CW Staff

NEW YORK — The new delays that have set back the trial date in the government's antitrust case against IBM (CW, Feb. 26) have led to a great deal of speculation that the parties may be negotiating an out-of-court settlement.

Both parties deny emphatically such negotiations are taking place and have promised to inform the judge hearing the case if they do, in fact, start to negotiate. And IBM, in turn, has indicated the public will be informed early of any negotiations.

While many may discount the denials by both sides in the case, it appears there is little room for either side to currently settle the action.

Most who feel there will be a settlement think it would be to IBM's advantage to settle the case so the firm will not be faced with subsequent suits from users and firms in the industry in case it loses the antitrust action.

These sources point out that a government victory could be used by others as prima facie evidence that IBM was guilty of monopolization, therefore making subsequent antitrust cases easier — and less expensive — to litigate against the firm.

To accept this view, however, would mean that one would have to believe IBM feels it is guilty and runs a great risk of future cases.

#### Not the case

Clearly, from all public statements from the firm and its lawyers, this is not the case. IBM — and its legal army — appears to be extremely confident it can win.

Technically, then, IBM knows it has a good case and the chance of winning it. To clean its name in court. Balanced against this is only the worry that, if it loses, it could be faced with massive, subsequent actions.

And even this worry could be much smaller than many in the industry have been led to believe. The antitrust suit is only a hurt by follow-up actions after losing cases to the government — after all, Alcoa and Standard Oil still seem to be doing pretty well, even though they were both loosed.

#### Potential Political Dynamite

On the government side, there is probably less reason to settle than there is on the IBM side, even though the cost and manpower needed to prepare and try such a large case could be substantial. The government drifts in this direction.

Since IBM won the latest round in the Telex action and since it feels confident it can win a government case, the firm would obviously not be willing to offer the government much relief through a consent decree.

And without a great deal of concessions from IBM, any settlement agreed to by

the government would come under a tremendous amount of political fire — which an administration that has pledged to use the antitrust laws vigorously would find hard to take.

IBM's message last year of the Tunney bill, which opened up consent negotiations to public scrutiny, the days when the government and a private party, hidden from public view, could quietly negotiate

It is therefore clear no decree could be negotiated in today's political and industry climate without a great deal of hue and cry from both the politicians and the industry — and, with a large number of politicians already off and running for the 1976 elections, the results could be politically undesirable for the Ford administration.

Furthermore, the government also feels it has a solid legal case against IBM, even if it does not know exactly what is planned for the case. For this reason, the Justice Department lawyers assigned to the case — and, so far, their superiors also — are anxious to pursue the matter to see if their interpretation of the law will be upheld.

The Justice Department has been under a great deal of fire for its actions in the Watergate affair and in handling other antitrust matters such as the ITT case. A settlement now with IBM would further damage the reputation of the department. All of this reasoning suggests today, therefore, indicates the case will go on — if the government can ever dig itself out of its massive paperwork burden.

## Analysis

a consent decree is gone. Now every action taken in such negotiations will be open to comment and the government will have to explain its actions.

Trustbusters on Capitol Hill are becoming more and more vocal all the time and most of them are centered in the Democratic party. In addition, industry organizations such as the Computer Industry Association — would be sure to howl at any weak decree that the parties might try to negotiate.

Industrial Micro Sales to Reach \$887 Million by '83, Study Says

By Nancy French  
Of the CW Staff

Industrial microcomputer sales will increase to \$887 million in 1983, nearly 10 times the \$18.2 million in sales charted in 1974, a recent Frost & Sullivan, Inc. study predicted.

Dividing microcomputers into four categories representing the principal components of the microcomputer market — I/O interface equipment, microprocessors, microcomputer add-on memories and microcomputer programming — the report forecasts significant increases for each.

The highest growth for any product category is expected in sales of I/O interface equipment for industrial applications, with sales projected to increase from \$3.8 million in 1974 to \$225 million in 1983, the report said.

For microprocessors, sales should rise from the \$8.1 million reached in 1974 to \$406 million in 1983.

The microcomputer add-on memory market is expected to jump from \$5 million in 1974 to \$221 million in 1983. Within this total, read/write memory elements will overtake read-only elements within four years, the report said.

Microcomputer programs are generally implemented by large language processors. Cross-assemblers and other program development support will continue to be provided by the manufacturer.

turers, Frost and Sullivan said without quantifying this category.

The industrial market for mini-computer-based and microcomputer-based systems shows the microcomputer-dollar volume surpassing that of the mini after 1982.

As is currently shown by the low-end "microcomputer-on-a-card," the distinction between these two classes will continue to blur, the report predicted.

#### Five Market Groups

The report divided the market into five principal groups: manufacturing industries, process industries, mining, electric and gas utilities and foreign industrial sales.

The greatest volume of growth will occur in foreign industrial sales, with sales projected to jump from 14.2% in 1974 to 30.4% in 1983. In dollars, foreign sales will go from \$700,000 in 1973 to \$270 million in 1983.

Japanese and West European markets for the industrial application of microcomputers are expected to reflect distribution patterns similar to the U.S. domestic market in terms of principal industrial users. Their use of microcomputers in industry is expected to lag behind the U.S. by 2 to 3 years early in the decade, but should be reasonably concurrent.

(Continued on Page 34)



- Selectric-style keyboard generates full ASCII character set.
- 30 cps printer with interchangeable type fonts provides up to 6 superb copies.
- Unique operator-programmable 10-key pad speeds data entry.
- Tabs, margins, horizontal and vertical character and line spacing can be set or changed locally or under computer control.
- Coordinated controls and display panel simplify operation and keep operator apprised of system status.
- Convenient, comfortable, attractive work station.

Time is money.  
Boost productivity today with the Trendset Model 4000.

Call or write for details  
  
**trendset**  
An Applied Magnetics Company  
610 Perimeter, P.O. Box 5060, Sunnyvale, CA 94086 (408) 732-1790.



BASIC Timesharing

JUST ONE OF THE MANY LEADING COMPUTER COMPANIES  
YOU'LL BE SEEING AT THE 1975 COMPUTER CARAVAN.

BASIC Timesharing will display the new Model 4000 Interactive Timesharing System - the only minicomputer-based system that can be expanded to support from 16 to 256 users. Mass storage expandable to 5 Gbytes. CPU power and disk storage dynamically deployable to meet user demand.

## The Computer Caravan/75

The traveling computer user's forum and exposition  
sponsored by COMPUTERWORLD

797 Washington St., Newton, Mass. 02160 (617) 965 5800

ATLANTA • PHILADELPHIA • HARTFORD • NEW YORK  
CLEVELAND • CHICAGO • PALESTINE • SEATTLE • SAN FRANCISCO

# Stretching your hardware dollar

A special report on hardware options that can save you money.  
in the March 26th issue of Computerworld.

In this special supplement to Computerworld, edited by Vic Farmer, we'll be taking a look at different ways users have maximized performance and saved money at their installations through hardware options - including used computers, multiple vendors, and various leasing arrangements, to name a few. The risks involved in these options are an important part of this special Computerworld report, and we'll analyze them in detail. You'll see articles like these:

- Applications stories that profile users who have successfully saved money through various hardware options.
- The benefits and risks of long-term and third-party leases, and other leasing arrangements.
- Used computers - a bargain or a challenge?
- 360 enhancements - what the independents are doing to increase their data processing power.
- An analysis of the activity of independent Peripheral Suppliers and their helpfulness to users over the past five years.

If you're looking for ways to save hardware dollars at your installation, then you should be reading this special report in the March 26th issue of Computerworld. And if you're marketing peripheral equipment, used computers or leased computers to the EDP industry, don't miss our March 7th ad closing. Contact your Computerworld salesman for all the details. Or call Judy Millford at (617) 965 5800.

**COMPUTERWORLD**

### National Sales Office

Neal Wader  
Dottie Travis  
(617) 965 5800

Bob Ziegel  
Mike Burman  
(617) 965 5800

New York  
Don Fagan  
Frank Gallo  
(201) 461 2575

Los Angeles  
Bob Byrne  
(213) 477 4208

San Francisco  
Bill Healey  
(415) 362 8547

# Three-Pronged Service Strategy Helps DRI Customers Forecast

By Patrick Ward  
and Edith Holmes

LEXINGTON, Mass. - Data Resources, Inc. (DRI) specializes in providing economic models of the U.S. and foreign economies to customer firms for financial planning and forecasting.

In addition, DRI provides consultants to help individual customers to determine what the general forecast means to them. Those who build their own models can tie their industry into DRI's continually updated national models, President Otto Eckstein noted.

Eckstein, a Harvard economics professor and a former member of the President's Council of Economic Advisors, is himself one part of DRI's three-pronged service to customers, said Fred Bamber, group manager of the company's Boston and Pittsburgh consultants.

### Economy Always Changing

Since the economy is always changing, customers need continuous problem solving and should have some internal capability to help themselves, Bamber said, so the third part of DRI's service allows the

customers time-sharing access to "our bag of tricks... the software and the set of tools to do what we do."

"Most of our customers employ all three," Bamber said. "For example, the Council of Economic Advisors wants to hear Eckstein, yet it also wants to plug its own numbers and assumptions into DRI's models."

Now, the Council calls in a DRI consultant who is the interface between our machines and the time-sharing users."

Consultants and the time-sharing system fulfill users' microeconomic needs, according to Bamber, while Eckstein and DRI's monthly third-report, "The Data Resources Review," provide customers with the macroeconomic view, according to Bamber.

DRI provides its time-sharing customers local access through a small number of limited in-Wats lines and leased lines to concentrators or multiplexers in Washington, Tel Aviv, New York, Pittsburgh, Chicago and Hartford.

The company also uses the Tymnet digital network with service to 80 other cities. Customers in Brussels, Paris and London come in through the Tymshare network. There are no differential rates except for calls from Europe, John L. Lauer, DRI vice-president, said.

### DRI Equipment

The DRI data center currently includes a 2.5M byte Burroughs 6700 with two CPU's, two I/O processors and two communication processors. There is also a 6M byte Burroughs 7700 with a similar configuration.

DRI plans to convert to a four-CPU 7700 this summer.

Eckstein said DRI chose Burroughs because its work is not oriented to number-crunching, but to making economic calculations with lots of data. DRI first selected Burroughs because of the Master Control Program (MCP) on the 5500.

## Micro Sales to Hit \$887 Million by '83

(Continued from Page 33)

current by the early 1980s.

Sales to the manufacturing industries are expected to rise from \$5.2 million in 1974 to \$1.2 billion in 1983. Sales to the service industries, which will increase in dollar volume, will decrease sharply in percentage, with the 1974 market share of 55% dropping to 26.6% in 1983, behind foreign industrial sales and the process industries.

Within manufacturing, the report indicates that the electronic equipment manufacturers will be the largest users with fabricated metals, a major OEM for microcomputers.

The process industries, almost exclusively end users of microcomputers, are next in line to be the largest in 1983. By 1983, they will be the second largest market segment, with 29.5% of microcomputer purchases, grossing \$261.0 million, compared with \$4.2 million in 1974.

Micros will be sold to the process industries primarily by the instrumentation manufacturers (fabricated metals), according to Frost & Sullivan.

The chemicals category is anticipated to be the largest individual process or manufacturing user industry by 1983, when even the smaller chemical producers will be able to justify and deploy.

The paper and allied products, however, will be in the other process industries, including pulp and paper, rubber and plastics, glass and ceramics, cement and textiles.

The mining industry is expected to increase its usage from an almost negligible \$200,000 in 1974 to a respectable \$32 million by 1983. The industry's current emphasis on plant expansion, coupled with the demand for mined raw materials, will contribute to this upsurge.

## Another Approach to Professional Development

# Oil Company Becomes Vendor of DP Training Courses

HOUSTON, Texas — Forms Analysis and Design, Time-Sharing Option Basic and Cobol, IMS Concepts, Transition to Data Bases, Programming and Data Base Design, and your choice but from a catalog detailing the courses offered of a company dedicated to DP education.

These and other DP training courses have been developed internally over the last seven years by Shell Oil Co.'s Information Systems Department and first been made available to the public.

"Why has Shell become a vendor of DP courses? The oil companies are in the midst of a changing environment; the last few months have forced us to think about alternative means of maintaining a viable organization," said T.R. Young, manager of training with the Information Systems Department.

"We are pursuing a profit, but revenues from this product line won't be anything to cause Wall Street to take notice," he added. "Within this department, we are concerned about the variable quality of DP training available in the commercial market."

### Course Offerings

Shell's course deal with programming, hardware/systems, data management and applications. In addition, introductory classes offered in such areas as Critical Path Method/Program Evaluation Review Technique (CPM/PERT), experimental design, linear programming, regression analysis and terminal-oriented systems design. Shell includes all but about six of its internally developed programs in a catalog of 26 commercially available classes.

Since July, these courses have been attended by employees of such diverse organizations as Walter Reed Hospital, NCR, Blue Cross of Virginia, Tennessee Life Insurance Co., the University of Texas Medical Branch, Mobil Oil, Texaco and Penzance Young noted.

"When we first offered 'Design' was the first course where we received full attendance," he said. He added that several attendees commented they had had difficulty finding courses similar to those offered by the oil company in TSO, IMS and Mark IV.

Providing courses not generally available is one factor that distinguishes Shell from other DP education vendors, Young said.

In addition, since some courses have been developed to meet the needs of the company's "development people," he heard about it immediately if there is anything inadequate about them," he added.

## SEC Investigating CA For Stock Violations

IRVINE, Calif. — Computer Automation, Inc. (CA) is under informal investigation by the Los Angeles office of the Securities and Exchange Commission (SEC) for possible violations of the Securities Exchange Act of 1934, according to a recent announcement from CA President David H. Metivin.

While Metivin said he believes no violations have occurred, a source attributed the investigation to claims company officials traded substantial amounts of stock immediately prior to a recent major layoff.

Metivin said extensive inquiries of company officers and directors are being conducted, although no formal order has been issued by the SEC and no specific charges against the company or its officers and directors have been made.

The SEC official making the investigation would say only that such investigations are not made public until the commission decides to take some action on the basis of the information uncovered.

Finally, he noted Shell spends an extensive amount of course time in workshop exercises, using keyboard terminals. "While our courses tend to be 20% longer than other courses, a result of the emphasis on training experience, we feel it leave more students with a workable skill."

Limited to 12 people, terminal workshops provide one terminal for every two students. For nonterminal courses such as Cobol or JCL, a maximum of 20 students is used, Young said.

Students are trained on Shell's IBM 370/168s, Univas 1110s and Univas 1108s, but none of these machines are dedicated to training alone.

Most of the courses offered are conducted with lectures and accompanying slide presentations. Young said the company is investigating other means of training. "We've been using a video training

studio moderately for five years, he said. Soon we will be adding color to its black-and-white facilities."

In addition, the training department has used IBM's Interactive Training System (ITS) Computer-Aided Instruction (CAI) for the last year, according to Young. He said the department has also recently acquired a trainer specialized in this area.

"We could probably get by with ITS, CAI and video package alone," Young said. "Our costs would probably be \$66 to \$70 per student per day. Electronic media would reduce our costs to \$3 for each student each day."

But the training department prefers to maintain a close student-teacher contact, he said. "And I have yet to meet a media trainer who has measured the effectiveness

of his training."

He indicated Shell will add project management, IBM 3270 screen formatting and design and Ramis to its list of offerings this year.

### In the Black

Young noted, at rates of \$90/student-day, the program of outside course offerings will be in the black 30 days after it began operation. "We simply used two direct-mail solicitations to large companies to gain our present clientele," he said.

Where the oil company will go from here with its outside training program, Young doesn't know. Will Shell begin to spin off its DP training after the fashion of the aerospace companies five years ago? "Your guess is as good as mine," he said.

## BIG MEXICAN OIL DISCOVERY MEANS BIGGER MARKET FOR COMPUTERS, PERIPHERALS, SOFTWARE.

### COMPUTERS, NOT GOLD-PLATED CADDYS

The big news of discoveries in Mexican crude oil emulsions of petroleum. The money will not be spent frivolously. The focus of investment is immediately to change the standard of living jobs and the created.

The major element of the program of industrialization and modernization include

greatly increased computer use. Along with computers will come peripherals, data transmission, systems communication systems software.

The same serious commitment prevails in Ecuador, Peru, Venezuela. Their petro-dollars will be used to hasten development. And Mexico is the gateway to the Latin American Market.

### HOW TO REACH THIS NEW MARKET

U.S. computer manufacturers have available a ready-made proven strategy for the American market entry of expansion. The 1975 Latin American Computer Exposition, FEBRA '75, will be held in Mexico City, July 21-25, 1975.

### SPRING: LEARN HOW TO HANDLE YOURSELF SOUTH OF THE BORDER.

For more information, contact: ICELA, Inc., 1000 Wilshire Boulevard, Suite 1000, Los Angeles, California 90020, (213) 620-1000.

Or, for more information on the Latin American Computer Exposition, contact: ICELA, Inc., 1000 Wilshire Boulevard, Suite 1000, Los Angeles, California 90020, (213) 620-1000.

Or, for more information on the Latin American Computer Exposition, contact: ICELA, Inc., 1000 Wilshire Boulevard, Suite 1000, Los Angeles, California 90020, (213) 620-1000.



### 5th Annual INTERNATIONAL COMPUTER EXPOSITION

For Latin America

MARIA ISABEL-SHERATON HOTEL  
MEXICO CITY, JULY 21-25, 1975

Sponsored by: Sociedad Mexicana de Computación Electrónica, A.C.

Call or Write Today

SEYMOUR A. ROBBINS

Exhibit Manager

NATIONAL EXPOSITIONS CO., INC.

14 West 40th Street

New York, N.Y. 10018

212 564-8714

## In Face of 'Flatter Business'

## Wangco Expanding Tape, Disk Drive Product Lines

By Molly Upton  
Of the CW Staff

LOS ANGELES—Although business is "flatter than ever," Wangco, a maker of tape and disk drives for minicomputers, is moving ahead with a barrage of new products.

George Toor, vice-president of marketing and one of the firm's founders, said he expects business to resume once inventories have been reduced. Some customers are stretching out orders, although some have increased their demands, he said.

In addition to its line of OEM tape and disk products, Wangco is developing specialized products, which generally incorporate Wangco's standard production components, he noted.

This new effort has been in response to specific demands, he said, rather than trying to compensate for the increasing

trend among minimakers to vertically integrate their operations.

## The Brightest Star

Perhaps the brightest star among its new products is the Series N/32 nonplaceable moving-head disk, which has the "happy coincidence" of having the same capacity as the disk used in IBM's System 32.

It is self-contained, and Toor sees this as meeting the demands of other mainframes deciding to bring out a product competing with the System/32.

Wangco also is looking at doubling the capacity of its standard line of disk drives, which will result in a 20M byte capacity with a replaceable cartridge offering double data density, retaining 200 track/in. Toor said.

In the tape area, Wangco may bring out a 125 in./sec unit before the end of the

year. This product will have the same automatic cartridge-threading feature as its Model 12.

## A Conservative Design

Among the features being planned are a conservative design, which Toor explained means a low power consumption, easy adjustability and good reliability. Although the market tends to dictate a larger unit, the size of the tape box is not a critical factor, he said.

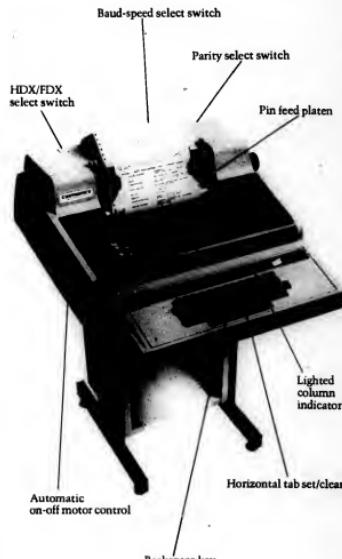
## Cipher Orders Picking Up Again

By a CW Staff Writer

SAN DIEGO—Cipher Data Products' revenues should grow between 20% and 25% during 1975, compared with 75% in 1974, said Robert K. Holst, western regional marketing manager.

## What's new in printers? Ask Centronics.

## The non-extra extras in Centronics Teleprinters



At no extra cost, you get features that can cost you plenty in other teleprinters.

Things like automatic on-off motor control, baud-speed select switch, horizontal tab set/clear, parity switch, pin feed platen. They're all standard, no-charge features of Centronics Model 308, 200-column and Model 508 132-column 1200 baud BSR teleprinters.

Other pluses include a detachable 37- or 33-style keyboard, backspace key for editing, an HDX/FDX mode select switch, asymmetrical communications, and instant character visibility.

We call these extras "your 1¢ get" at no price in some teleprinters—extras that pay off in data entry/inquiry-response, message switching, time-sharing, and I/O writer applications. Options like current loop line power supply, selectable bold-face characters on command, and elapsed-time indicator.

You get faster speeds, too. Print up to 165 characters per second. With a fast paper slew rate. Just one of these low-cost "increments" tells you—printers can often replace several slow-speed units, saving the expense of multiple slow-speed dial-up lines.

Other options include automatic answer, answering back, vertical format control, stand, forms-receiving tray, and international language character sets.

For reliability proven in tens of thousands of installations, look to Centronics. You'll find the broadest selection of options and peripherals available. And optimum price-performance ratios. High volume production assures prompt delivery. Service and parts are available through a network of field service offices. Call our office nearest you for full information about 308 or 508 teleprinters, or our other model in the broad Centronics line—Centronics Data Computer Corp., Hudson, New Hampshire 03051. Tel. (603) 883-0111.

Eastern Region: Burlington, Mass. (617) 273-8545  
Central Region: Kettering, Ohio, (513) 294-0070  
Western Region: Santa Ana, Calif. (714) 579-6650

Centronics Data Computer (Canada) Ltd.: Mississauga, Ont. (416) 625-0770  
Centronics International Corp.: Brussels, Belgium 02-762-3573

**CENTRONICS**

CENTRONICS/the largest and fastest-growing family of medium-speed printers

Toor said it is difficult to assess what effect minimakers' vertical integration scheme may have had on the miniperipherals business, since this action generally coincided with the downturn in the economy.

The floppy disk is a "logical kind of product" for Wangco, but not now, he said. "If he adds it in, if he decides to enter the field, it will be when the volume of orders is greater and the number of competitors fewer."

Incoming orders for Cipher's tape drives held up fairly well until about November, when customers started extensions, he said. However, western customers are suddenly placing smaller orders again, he added.

Cipher, an OEM supplier of both incremental and continuous tape drives as well as cassette drives, is now marketing an add-on 16M memory compatible with Digital Equipment Corp. PDP-11s.

The unit is made by parent company Computer Machinery Corp. (CMC) for its own computers and keeps its systems separate. Cipher will market it, initially on an OEM basis.

Being related to CMC benefits Cipher because many OEM customers appreciate the fast service supplied by CMC, he said. CMC orders account for no more than 20% of Cipher sales, Holst estimated.

## Other Markets

Other major markets are other key-to-market makers, systems houses and military applications. The firm is pursuing the telephone industry as a specialized market. Centronics' main equipment need is to be made for central office switching equipment, but much of the basic tape drive is used, he said.

Holst hasn't noticed that minimakers' vertical integration, or bringing peripherals manufacturing in-house, has affected Cipher. He did observe that the larger tape drive makers have been "selectively seeking accounts in order to squeeze out the little guy."

This may be a result of larger firms trying harder to maintain volume in the face of stretched-out deliveries, he suggested.

The foreign market for cassette drives is expected to increase dramatically, while the U.S. picture looks more stable, he said.

In order to be prepared for projections that the cassette disk will replace the cassette, and because the market estimates are so large, Cipher plans to introduce a floppy disk drive in May, probably at the National Computer Conference, he said.

## New Registrations

**ELECTRONIC DATA SYSTEMS CORP.** (EDS) of Parsippany, N.J. (201) 223-5121, has filed to register 100,000 shares of common for the Qualified Stock Option Plan. No underwriter is involved.

**BRADFORD COMPUTER & SYSTEMS, INC.**, 1700 Broadway, New York, N.Y. 10019, a computer-based critical service firm, has filed to register 5,000,000 shares of common subject to a merger between a wholly-owned subsidiary of Bradford and a holding company. In March 2,234 Bradford shares will be issued for each share of common outstanding of Centexx common. No underwriter is involved.

**THE FOXBORO CO.**, 38 Neponset Ave., Foxboro, Mass. 02035, a manufacturer and distributor of instrumentation and systems for process control, has filed to register 1,790 shares of common to stockholders of Transonic, Inc. Transonic is engaged in the development, production, acquisition and liquidation of Transonic, Inc. No underwriter is involved.

**DIGITAL EQUIPMENT CORP.**, 146 Main St., Maynard, Mass. 01754, a computer firm, has filed to register 23,911 shares of common. No underwriter is involved.

## IBM Shows Microprogrammable Units for Military

By E. Drake Lundell Jr.  
Of the CW Staff

WASHINGTON, D.C. — Although defense business accounts for only 3% of IBM's total revenues, it is not ignoring that market, as two recent product introductions prove.

At the recently concluded Navy League Show here, the firm conducted the first public showing of its System/4 PI ML-1

general-purpose aerospace computer along with a new Advance Signal Processor (APS) unit designed for shipboard and aerospace applications.

Each unit is microprogrammable, a feature that is being pushed in the military market by IBM despite its reluctance to permit user microprogramming in its commercial systems.

The newest member of the System/4 PI

family uses large-scale integration technology for a 256-word unit that contains 32K words of main memory and a "performance capability in excess of 400,000 operations per second," according to IBM.

The unit, the firm added, is "adaptable to a wide variety of applications such as guidance and navigation weapons delivery, digital flight control and communications."

### Choice of Memories

The organization of the unit permits the choice of floating-point, cordic algorithms, core or monolithic memory and various microprogram instruction sets and communications options, the firm added.

The unit has an asynchronous memory interface said to permit the use of new storage developments without changing the unit, and it features a repertoire of 108 instructions.

The APS is said to be capable of signal processing throughput of 10M to 20M multiply/sec and is expandable to 40M; and provides a direct memory access I/O rate of 10Mbytes/sec/channel with eight input and eight output channels available.

The unit will be used for missileborn signal processing, according to IBM, which also refers to it as a signal analyzer.

## Disk spooler improves 360 run times up to 25 per cent!



Power-TM is a proprietary software package that has something very precious to offer you.

Time.

With it, any S/360 user with 64K bytes of core can sideline bottleneck jobs until there's time available to run them.

From our experience, that means an instant improvement in background

run time of between fifteen and twenty-five percent.

Power-TM is a writer-only system. It's economical, a simple addition to your system, and requires virtually no operator training nor intervention.

Let your nearest Dearborn office give you a first-hand demonstration. But call right now.

Every nanosecond counts.

## dearborn



dearborn computer leasing CO. chicago (312) 671-4410  
toronto (416) 621-7000 st. louis (314) 727-2727 cincinnati (513) 771-1277

Member Computer Leasing Association

## IBM 360/195 for only 50¢ a Second

GUARANTEED TURNAROUND!

**COMPARE — REQUEST A BENCHMARK**

2 meg; 2314's — 3330's — 3420's  
**OS/MVT • HASP/RJE**  
 Ans Cebco, Ferrtree G, G1, H, Assembler, F & H, PL/I and PL/I Optimizing and Checkout Compilers.  
 MPSX — GPSS — PMS — SSP — CSMP — OSIRIS

Our typical customer is knowledgeable in OS; has good working knowledge of PL/I, and the functions of the compilers/assemblers he uses. Usually has IBM 360 and 370 compatible terminal and is familiar with its operation and that of HASP/RJE.

Call or Write

**UNITED AIRLINES**

Computer Services Division W • Denver Technological Center  
 5350 So. Valentine Way • Englewood, Colorado 80110  
 Denver (303) 398-5936



### Ask the countries that own some.

Folks say our Intertron synchronous sets are good enough. Good enough to be a part of TCTS Dataroute in Canada. And for discriminating users within the U.S.

The reason: We offer these good features:

- Data rates from 2400 bps to 230.4 kbps. (Up to 1 megabit on special order.)
- Pulse or pulse position modulator scheme. No adjustments, period. Best error performance over marginal circuits.
- Meets AT&T metallic specifications.
- Positive system diagnostics: Local and remote loop. Helpful circuit trouble alarm light.

Now we've improved our Intertron. With our new, extraordinarily low priced 30-day rental program.

Intertron. World respected, competitively priced. We've given it a good value and made it greater.

**Intertron**  
 computer transmission corporation  
 2352 Utah Avenue B • El Segundo, California 90243  
 (310) 573-3222

No simplistic solutions.  
 Only productive decisions.

Cut and Mail	Cut and Mail
Marketing Dept.	
Tran./Computer/Transmission Corp.	
2352 Utah Avenue	
El Segundo, CA 90243	
<input type="checkbox"/> Send me the details about your products and 30-day rental program.	
<input type="checkbox"/> I would like to have a salesperson call.	
Name _____	
Title _____	
Company _____	
Address _____	
Dept./Mail Station _____	
City _____ State _____ Zip _____	
Area Code _____ Phone _____	
Ext. _____	
Cut and Mail	Cut and Mail

## Has Tailored Program

By Catherine Arnst  
Of the CW Staff

**SOUTHLFIELD, Mich.** — Traditionally, the closest a rock band ever gets to automation is the Moog synthesizer. But entertainment Data Systems is attempting to alter that situation with a computerized accounting system aimed specifically at entertainers.

The company was born last summer by Tom Connor, a band manager, and Chic Young, his accountant, who worked out a computer program for musicians that would assure them an ongoing method of tracking expenses, income and profits on a regular basis.

Young had already developed a similar program for doctors; Connor suggested designing a more specialized one for the music business.

Written in BASIC and RPG and run on a Cascade PC or a computer, the program uses a customized language peculiar to show business. Words such as "big," "drumstick," and "strings" (job, stick for playing drums and guitar strings, respectively) make the program easy for musicians to apply their needs.

### Only Program of Its Kind

This is the only program of its kind, Connor claimed, adding it brings needed order to a business which tends to "have everything in a shopping bag" when it comes to keeping financial records.

"Show business is traditionally handled on a cash-and-carry basis, which makes for really sloppy accounting," Entertainers usually find it "a pain in the neck to do the books," he said.

With Entertainers Data's system, the client assigns an account number to each check he writes and fills out an expense form. He receives a detailed profit and loss statement monthly, which includes a breakdown of any special items he wishes.

The program is especially valuable as a tool to predict all expenses and overhead against income, enabling the client to be aware of the profit possible from

any job, said Connor.

"If the band earns \$1,500 per week gross, with a previous history profile we can figure the average replacement costs of drumsticks, truck rental, food and so on. You can then figure up with a 30% expense figure that you have to write off the top. Then you know it will be profitable."

The firm also handles concerts and so far has one concert agency and four bands as its clients. Connor feels the company's greatest potential is serving large touring bands such as Led Zeppelin and Alice Cooper.

## Contracts

Codex Corp. has signed a three-year contract with the German telecommunications manufacturer, Tekelec-FCF GmbH, to supply data communications products valued at more than \$7 million.

The Hughes Aircraft Co. Ground Systems Group has received a contract addition to the Navy's Sea Tester Command to supply "data display consoles for ships of the U.S. Navy."

Systems, Inc. has signed a long-term contract with First Michigan Bank and Trust Co. for operation and management of a central DP facility.

Logicon, Inc. has been awarded a contract upgrade with the U.S. Navy Electronic Systems Engineering Center for development of a mobile data link communications test and training system.

Compuscan, Inc. has been awarded a \$6.2 million contract to furnish Crosfield Electronics with OCR equipment and editing terminals over a three-year period.

Varian Data Machines has received a contract order to supply AutoCAD, with 59 Varian 620L computers for use in its automated drafting systems.

Computer Sciences Corp. has been awarded a one-year, \$400,000 supply contract for implementation of the U.S. Air Force's J73 programming language.

Advanced Electronics Design, Inc. has begun shipment of AED 2500 floppy disk systems under a \$250,000 contract award from Stromberg Dataphysic, Inc. for use in its System 4500 COM reader.

Computer Network Corp. has been awarded a production and development contract from the U.S. Department of Health, Education and Welfare for data processing for the Guaranteed Student Loan Program.

Comtel Corp. has signed a DP service contract with Joseph A. Henzel, Inc. and Burns Bros. Manufacturing, Inc.

Western Union Banking Systems has been awarded two contracts totaling more than \$1.7 million by The Chase Manhattan Bank for DP and communications-oriented systems to automate and monitor the bank's money transfer operations.

The New York Stock Exchange Service Corp. has signed a long-term service contract with International Time-Sharing Corp. to market time-sharing services and provide customer support.

University Computing Co. has signed a five-year contract with the National Bank of Tulsa to provide data processing for the bank's operation.

Electronic Data Preparation Corp., a subsidiary of EDP Corp., has renewed and expanded its contract with the Indiana Department of Revenue for operation of the department's DP center for the next three years.



### VOLUME KEY PUNCHING

HERE IS A DEPENDABLE WAY OLD FASHIONED RELIABILITY WITH MODERN EXPERIENCE ECONOMICAL. OUR PRICE TELLS THE STORY. CALL TODAY!

(402) 346-0330

**AMERICAN KEY PUNCH**  
Redick Tower, Omaha, Nebraska 68102



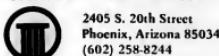
### OMNITEC ANNOUNCES AUTOMATIC ANSWER ACOUSTIC COUPLERS

Now available from Omnitec is a unit which combines the convenience and economy of acoustic coupling with automatic-answer capability for unattended terminal operation.

The Model 703A is suitable for use in computer time-sharing, automatic polling and message exchange applications. this 300 baud unit also features originate/answer operating modes, full or half duplex switching, standard TTY or EIA interfacing and much more.

### OMNITEC CORPORATION

2405 S. 20th Street  
Phoenix, Arizona 85034  
(602) 258-8244



## Position Announcements

### SYSTEMS PROGRAMMER 11

\$1,206-\$1,543

**General Duties:** Work with management to determine new software and hardware requirements. Has primary responsibility for the maintenance and development of technical support of computer operating systems and related software. Minimum qualifications: BS in computer science or equivalent; 2 years experience in systems programming, including experience with COBOL compiler and current data management software (Oracle-11). Final exam will be by Oral/Written Board.

Deadline for applications is Monday, March 10, 1975 at 8 p.m.

### UNIVERSITY OF WASHINGTON

1416 NE 45th St.  
Seattle, Washington 98105  
Phone: (206) 543-3700

an equal opportunity and affirmative action employer

## IMS Systems Programmer

Important new lead position in the establishment of a software development center. The position has responsibility for the establishment and support of an OS, MFT shop. Future tasks will include conversion to a 32-bit IMS operation within one year.

Background sought is 2 or more years of experience in planning and executing with OS System; data base design; HASP; and BTAM. Execution of Imagen is an asset.

For this position, we seek a responsible individual who is a problem solver and achieves something who can perform independently. Good working conditions. Attractive compensation and fringe benefits are offered. We are a leading agricultural chemical company.

For further information send resume or letter in confidence to:

Personnel Department  
**CF INDUSTRIES, INC.**  
100 South Wacker Drive  
Chicago, Illinois 60606

An Equal Opportunity Employer

### CF Industries, Inc.



### SALESWORLD, INC.

#### COMMUNICATION SYSTEMS

\$36,000-\$40,000

1974 marks the fourth consecutive year that this prestigious manufacturer has doubled its sales volume. We are seeking salesmen of Communications Systems to be placed in a variety of accounts to Fortune 1000 Industrial and commercial accounts. To accommodate our growth, we are seeking salesmen in one of the following territories to be added to the Western Region. The qualities we seek in our salesmen are: sales records in the same type of computer systems. Employee will provide salary in addition to cold earnings, profit sharing, and other benefits. Send resume to: Sales Manager, program that allows earnings between \$36-\$40,000. To arrange for a personal interview, call Mr. R. Smiths at (213) 475-8607 concerning position #1113-RS.

#### POSITIONS NOW OPEN

SALES — Intelligence Terminals	.....	\$40,000K
SALES — Mainframes	.....	\$27.34K
SALES — Mini-Computers	.....	\$20.00K
SALES — Data Communication Terminals	.....	\$7.6-10K
SALES — Teletype/Printers	.....	\$5.25K
SALES — Data Processing Services	.....	\$2.25K
SALES — Data Processing Services	.....	\$2.25K
MMG, REC — Mainframes	.....	\$2.0-2.5K
MMG, REC — Mini-Computers	.....	\$2.0-2.5K
MMG, REC — Facsimile Sys.	.....	\$2.5-3.4K
MMG, REC — Mini-Computers	.....	\$2.0-2.5K
NATL ACTCTS REC — Servers	.....	\$1.5-2.0K
NATL ACTCTS REC — Servers	.....	\$1.5-2.0K
NATL ACTCTS REC — Computer Output	.....	\$1.0-1.5K
ACCTS REC — Mini-Computers	.....	\$1.0-1.5K
ACCTS REC — and more, all need	.....	\$1.0-1.5K

### SALESWORLD, INC.

ATLANTA — 2905 Peachtree Road South, 110-R	.....	(404) 458-8981
BALTIMORE — Investment Bldg., 1000 N. Charles	.....	(301) 296-5600
CHICAGO — John Hancock Center, 333 N. Michigan	.....	(312) 265-8200
CLEVELAND — 3121 Euclid Ave., 200-R	.....	(216) 432-2700
DALLAS — 1111 West Mockingbird, 1000-R	.....	(214) 550-5081
DETROIT — 3000 Telegraph Road, 9340-R	.....	(313) 647-7400
HOUSTON — 9500 Northwest Freeway, 5514-R	.....	(713) 581-4485
LOS ANGELES — 10550 Wilshire Blvd., #1840-R	.....	(213) 475-8601
ALL OFFICES COMPANY OWNED AND MANAGED	.....	

## POSITION ANNOUNCEMENTS



## OUR PAIR OF 370/158'S

Needs more growth-conscious

SYSTEMS  
PROGRAMMERS

## The Company —

Ashland is one of the smaller oil companies, but our volume approaching \$4 billion a year provides ample career room... in an outstandingly stable, recession-resistant industry.

## The Scene —

Ashland is a bustling, very pleasant small city, 150 miles or less from Cincinnati, Lexington or Columbus, amid beautiful Kentucky country. You'll enjoy a mild climate, the best kind of family-oriented recreation, that's economical too — a wonderful area to settle in. We'll assist your relocation.

## The Jobs —

Provide on-site support in operations for teleprocessing and data base applications, development and implementation of operating standards, back-up recovery methods, procedures, and data base integrity assurance. Must have qualifications: 1) 2 years TPI or DOS/VS programming experience, 2) 1 year DOS/VS programming intervals, and a bachelor of science degree. Valuable will be an additional 1-2 years in INTERCOMM teleprocessing, modeling, data base, and/or systems analysis, or computer internal or both. Other TPI or data base experience will be considered.

Excellent salary and benefits. Please send resume in confidence to Mr. R.L. Johnson, Dept. CW-2, ASHLAND OIL, INC., P.O. Box 391, Ashland, Kentucky 41101.

An Equal Opportunity Employer M/F

**Ashland**

An Equal Opportunity Employer M/F

You're an experienced  
EDP professional  
engineer?

Join the leading independent provider of terminal systems. Outstanding career-growth potential. Minimum of 5 years experience with 360/370 mainframes. Experience with intelligent terminals. Should have software development experience in CICS/IMS, BTAM, QMAM or similar systems. Knowledge of volume and salary history to determine compensation. Qualified Sanders Data Systems terminals are located in Webster, Highway South, Nashville, and Atlanta. We have need sales representatives.

Equal opportunity and of  
minority status employees  
are encouraged to apply.

## DATA PROCESSING

If you are interested in relocating to the beautiful Northwest I currently have several excellent opportunities. Banking expertise preferred.

Jim Morris  
Human Resources  
Morris & Associates  
1221 11th Street, S.E.  
Bellevue, Washington 98004  
(206) 455-9600

## Systems Analyst (2)

Michigan Technological University, Houghton, Michigan, has immediate openings for systems analysts. Duties include systems analysis, data base development, and the use of graphics software. A College degree in computer science or equivalent in an academic environment is required. Experience in a business system is required. Job requirement: 1) Manager of Computer Services, Michigan Technological University, Houghton, Michigan 49931. Phone: (906) 483-3100. An Equal Opportunity Employer

Is Your  
Salary  
Keeping  
Pace  
With  
Inflation?

Do you know how much money your colleagues make for doing the work you do? Do you know which computing skills are most creative? Do you know how to get a better position?

Source Edp does. And we'll share what we know with you. Our ninth annual salary survey and career planning guide, "The Next Step," compiles salary data received on 15,000 computer professionals and adds to the data we've collected over our thirteen years of computer recruiting experience: danger signals that mean you should start looking for a new position; mistakes to avoid, strategy in career planning.

You'll also receive the "Digest of Computer Opportunities," our periodic supplement listing positions available right now in every part of the country.

For your free copies of our 1975 computer salary survey and national digest of computer opportunities write:

**source** **edp**

Source Edp  
Corporate Headquarters  
100 S. Wacker Drive, Suite 212  
Chicago, IL 60606

Or call your nearest Source Edp office:

East: New York (212) 682-1160, Philadelphia (215) 665-1717, Union, N.J. (201) 687-4700.  
Midwest: Chicago (312) 762-0657, Cleveland (216) 771-2070, Detroit (313) 962-3500, Kansas City (816) 451-3821, Milwaukee (414) 544-0000, St. Louis (314) 963-3800.  
South & Southwest: Atlanta (404) 634-5172, Dallas (214) 638-4080, Houston (713) 626-6705, New Orleans (504) 529-2576.  
West Coast: Los Angeles (213) 386-5500, Irvine, CA (714) 833-1730, Palo Alto (415) 328-7155, San Francisco (415) 434-2410.

When opportunity knocks—  
GRASP it!

## An Exceptional Company With Exceptional Products Needs Exceptional People.

Enthusiastic worldwide acceptance of our products has created exciting new career opportunities at SDI.

If you can sell, and have a technical understanding of DOS and DOS/VS, we can offer you special career opportunities, just about anywhere you would like to work and live! You must be familiar with computer room installations — but most of all you must have a proven performance record as a sales achiever. We promise compensation more than adequate to reward your efforts!

If you are a systems engineer, knowledgeable in DOS and DOS/VS, we have placements for people qualified to train customers, assist in installation of our widely used software packages, and provide real solutions to software problems. You must be a pro in commercial DOS and DOS/VS. If you are, we will match your capabilities with compensation. SDI, 880 Mitten Road, Webster, California 94010.

Call Ken Kert collect!  
415/697-3660, or send resume.

**SDI**

SDI — Creators of GRASP, EPAT, FMAINT & GRASP/VS.







**BUY SELL SWAP**

**COMMUNICATE**  
**HNB MARKETING COMPANY**

Specialists in buying-selling-leasing and configuring.  
All types of IBM terminals and controllers

3505 Knight Street  
Oceanside, New York 11572  
(516) 536-8338  
Member Computer Dealers Assoc.

**BUY SELL SWAP**

**FOR SALE**

360/30 - 96K (IBM)  
\$20,000  
2314-2313/1A (1 x 4)  
\$35,000  
BOTH \$50,000

Presently under  
IBM Maintenance  
Available August 1

JIM SPROUL  
UNITY SCHOOL  
Unity Village, Mo. 64065  
(816) 524-3550

**BUY SELL SWAP**

**UNIT RECORD DEALS.**  
Don't Make One Without Calling Us

- 1. No one (except IBM) has a bigger inventory
- 2. All types - instant delivery
- 3. Reconditioned, as is, or certified for IBM M.A.

**BUY, SELL, SWAP**  
Call Warner Rivera at (212) 557-3712

**GENESIS ONE COMPUTER**  
300 East 44th Street, New York, New York 10017

**360-370**  
**market place**  
**BUY SELL LEASE**

**TLW COMPUTER INDUSTRIES INC.**

ATLANTA: 3570 American Drive, Atlanta, Ga. 30341  
CHICAGO: 404-451-1895 TWX 810-757-3654  
SAN FRANCISCO: 408-249-0110  
LOS ANGELES: 213-373-6825

**IBM 1401**  
**WITH 1311 DISK**

For Sale  
Also 729 Tape Drives

\*\*\* D.P. Equipment  
Marketing Corp.  
260 W. Broadway, N.Y. 10013  
CALL (212) 925 7737 Ext. 1

**FOR SALE MDS**  
**TAPE TO PRINTER SYSTEM**

Mohawk Model 11610 high speed print station with 2207 tape drive, 1600 characters per second, 1000 lines with 1250 LPM capacity. This system has been maintained and is in excellent condition. \$15,000.00 offered for purchase for approximately 1000 hours of use. System available May 1975. Contact Bill Jones, Creative Press, Inc., 1000 N.W. 10th Street, Bala Cynwyd, PA 19477 or phone (412) 842-1920.

**selling**  
**370/155-I**

**leasing**  
2385-2 3145-I  
2065-I 3155-I

**buying**  
360/50H 360/40H  
1/0 SETS

**WRITE:** Computer Inc.  
2200 East Devon Ave.  
Des Plaines, IL 60016  
TWX 910-233-1478  
**CALL:** 312-297-3640  
East 206-359-4814  
West 415-944-0323  
**MEMBER COMPUTER DEALERS ASSOCIATION**

**FOR SALE/LEASE/RENT**

**MOHAWK KEYTAPES**  
7 & 9 Channel, High,  
Speed Printers, Modems  
Any Configuration to  
Specifications

**FRIDEN FLEXOWRITER**

121 Model 23021 & Model 2303  
BCD, 8-channel tape, odd parity,  
standard or high speed printer,  
Parallel Elite type style,  
facsimile ribbon, 9-inch carriage,  
standard key console, integrated  
automatic paper control, tape  
reversing, and more. Complete  
with desk and other accessories —  
excellent condition.  
\$10,000.00 for Model 23021, \$10,000  
for Model 2303 or \$2,000 if you  
buy both.

Call Mr. Tomcheck  
(210) 682-7400

**FOR SALE**

**MEMOREX 40 \$39,500**  
**48K CPU, CONSOLE, 300 PAGE READER**  
**600 LPM PRINTER, 29.4M BYTE DISK**

**HIS 200/2000**  
**IBM 360 LEASES**  
**360/40 F or G, 1/0**  
**MOS 1101s \$750**  
**UNIVAC 1108-II**  
**9200/9300**  
**DEC Minis**  
**COC-OP-MDS PRINTERS** [617]261-1100  
**AMERICAN USED COMPUTER CORP.**  
P.O. Box 68, Kenmore Station, Boston, MA 02215  
Member Computer Dealers Association

**MDS 1101**  
Data Recorders  
"Paid for themselves  
in 4 months" according to S.C. of  
New Orleans  
at  
**\$750 EACH**  
7 track, 200 BPI

**DFP INCORPORATED**

**BUY • SELL • LEASE • TRADE**

**Wanted IBM System 370's**  
Available: IBM Systems 360/370

**dfp**  
**dfp INCORPORATED**  
141 Central Park Avenue South  
Hartside, New York 10530  
Write or call: Norman Usher, Director of Brokerage, (914) 428-5000

**DFP INCORPORATED**

**DFP INCORPORATED**

**DFP INCORPORATED**



TIME FOR SALE	SOFTWARE FOR SALE	SOFTWARE FOR SALE	SOFTWARE FOR SALE
<b>NEW YORK</b>			
<b>KEYPUNCH</b> EXCESS TIME AVAILABLE	<b>370/158</b> VS2 HASP/RJE, TSO DOS Emulation Disk (3.5") 300-310 320-330 Tape (16) 300-310 320-330 Printers (5) 1403, (1) 3211 Excellent Technical Support Very attractive rates on all shifts Contact: Michael Kryszewsky (212) 584-3039 132 West 31 St. New York, N.Y. 10001	<b>THIS MEDICAL BILLING SYSTEM</b> can be a revenue generator for your office. You can now have the capability of billing insurance companies with this complete system for the medical industry. • Complete Insurance Forms • Bill Forwarding • Audit • Billing • Data Base • Occidental Computer Systems • 100% Compatible • No. 10000, Call: 1-802 (213) 435-1144	<b>ACCOUNTING SYSTEMS</b> PAYROLL GENERAL LEDGER ACCOUNTS PAYABLE INVENTORY ACCOUNTS RECEIVABLE
<b>NEW JERSEY</b>	<b>TIME BROKERS NEW YORK</b>		
<b>SPENCER</b> Data Processing Systems A Division of Spencer Gifts, Inc.	<b>Need Computer Time?</b> We Can Satisfy Your Requirements • PRICE • LOCATION • AVAILABILITY • DOWNSYS • RJE, TSO CALL (212) 867-5661 serving N.Y., N.J., CT. for ten years	<b>SYX</b> LOOKING FOR SOFTWARE? Free Software Search and Package Appraisal Service	<b>NEW! SORT/MERGE</b> UNDER RSX-11D ON THE PDP-11 • EFFICIENT • RELIABLE WRITE OR CALL FOR INFORMATION Cambridge Computer Associates, Inc. 222 Alewife Brook Parkway Cambridge, MA 02138 (617) 868-1111
<b>RHODE ISLAND</b>	<b>ILLINOIS</b>		
<b>IBM 370/115</b> 3rd Shift Available SYSTEM FEATURES INCLUDE: Virtual Memory 96K Hard Storage 4-3340 DASD's 1-3470 DASD's 2-3470 Tape 5600 MFCM 3270 Printer (1200 LPM) Parking, loading, saving forms storage, special utilities in- cluded. Providence area, \$2,700 monthly. Minimum one year lease. Telephone (401) 865-2345	<b>IBM 360/370 USERS</b> COMPUTER TIME AVAILABLE <b>370/158</b> 2 meg. 3320 (32Mn), 2314 2 meg. 3320 (32Mn), 2314 12 meg. 3320 (32Mn), 2314 DOS 24 hours - 7 days <b>370/155</b> 2 meg. 3320 (32Mn), 2314 (8Mn), 12 meg. 3320 (32Mn), 2314 (6Mn), 6 248K, 3320 (4Mn), 2314 (6Mn), 6 3420 (2Mn), 2314 (2Mn), 6 <b>370/135</b> 144K, 2314 (6Mn), 6 3420-5 (6Mn) <b>370/135</b> 144K, 2314 (6Mn), 6 3420-5 (6Mn) <b>370/135</b> 144K, 2314 (6Mn), 6 3420-5 (6Mn) <b>FOR FURTHER INFORMATION JIM WHITELAY (312) 346-1331</b> <b>PRINCIPAL COMPUTER TIME</b> 200 N. Michigan Avenue Chicago, Illinois, 60601 Largest Computer Time Sales Co.	<b>Software Suppliers</b> We are currently looking for: • Programmers 370/158 DOS/PL/I • Accounting in Fortran for 32K • COBOL • Accounts Receivable on-line 370/159 DOS/PL/I <b>Nova Users</b> Software Breakthrough ANS COBOL Compiler now avail- able. Top quality 16K or 32K versions	<b>ATTENTION EDP SERVICE ORGANIZATIONS</b> ARIES Corporation - a na- tional known computer soft- ware company is seeking to expands its Sales and Ser- vice Organizations to provide ARIES' proprietary software systems to the public. These systems include Program Oriented Budgeting and Ac- counting Systems. Established list of satisfied customers - Many installations in the U.S. and parts of U.S. - Call or send capabilities statement to: ARIES Corporation 200 77th Street Minneapolis, MN 55432 (612) 835-2366
<b>NEW YORK</b>	<b>Software for Sale</b>		
<b>WE ARE COMPUTER TIME BROKERS</b> Computer Reserves, Inc. (212) 541-8180	<b>System/3 General Ledger</b> • Financial data base • General chart of accounts • Report Writer • Allocation Get MORE from your System/3 <b>SOFT IN A MILE INTERNATIONAL</b> Em Square, Andover, Mass. 01810 (617) 475-5040	<b>COUNT ON ONE SYSTEM TO DO IT ALL: THE UCC FINANCIAL CONTROL SYSTEM.</b> A single data base software system that totally automates— • General ledger accounting • Responsibility reporting • Budgeting • Cost accounting • Management and statistical reporting UCC/FCFS has unmatched flexibility. And proven performance in over 100 installations. Call Richard Streller, Manager, Financial Software. (214) 637-5010	<b>Looking for accounting systems? Talk to the leaders.</b> <b>Over 1000 of them use ours.</b> Infonational offers a complete solution of accounting software or computer services. General Ledger, Accounts Receivable, Accounts Payable, Fixed As- sets, etc. Programs that can be used separately or as a totally integrated system. Check the features of our proven systems - professional documentation, on-site training programs, our 99.9% success rate. See why our systems have been chosen by over 1000 of the world's lead- ing firms. Including many banks and processing centers. Call or write for our literature and the office nearest you. Ask to see our client list so you can find out for yourself. Infonational World Head- quarters, Dept. P.O. Box 82477, San Diego, CA 92138 (714) 560-7070. <b>INFONATIONAL</b> talk to the leaders

## \* WANTED \*

Firms to: **Buy**  
**Sell**  
**Lease**  
**Sub-Lease**

Write or Call Collect - Today

It's our only business

**COMPUTER SALES, INC.**  
 Suite 310, Benjamin Fox Pavilion  
 Jenkintown, Pa. 19046 • (215) 886-8440  
 Member Computer Dealers Assoc.



## Autocoder/COBOL Translation

We have reduced our price for perfect  
 translation to 68¢ per line.

**ZEYN CORPORATION**

Box 2701, Champaign, IL 61820

## NEW PUBLICATIONS FROM FINANCIAL TECHNOLOGY

### "Loan Sources in the Federal Government"

Are you eligible to receive government, financial assistance for business or home buying purposes? If you should need such aid, in the form of a loan or loan guarantee, how and where can you apply? This booklet lists 7 general categories of federal financing, including education, business, home and farm loans. "Loan Sources in the Federal Government" is only \$3 postpaid.

### "SIC Directory"

List over 300 small business investment companies which have financed for 5 to 20 years small businesses. Many will also buy shares. Give SIC name, address, and capital size. This book gives you the knowhow to obtain long term financing for small businesses. Get your copy today by sending only \$10.

### "Tax Havens - What They Are and How They Work"

The monograph which gives a survey of tax havens around the world - countries with little or no taxes. Don't select the tax haven without comparing what other tax haven countries have to offer. Only \$5 postpaid.

## FINANCIAL TECHNOLOGY LIMITED

23 River Road  
 North Arlington, NJ. 07032

## MINI COMPUTER HARDWARE/ SOFTWARE INTEGRATION COURSE

For

Scientists and Engineers

This course is designed to teach the participant how to integrate the mini-computer into real world applications by understanding both hardware and software.

### COURSE DESCRIPTION

Comprehensive course covering mini-computer interfacing with special emphasis on input/output techniques (polling, interrupt, DMA, etc.) and machine level programming.

### COURSE DATES:

June 2-6  
 June 9-13  
 June 16-20  
 June 23-27

All Classes run 5 days: Monday thru Friday

COST: \$365.00

LOCATION: Mohawk, New York

### APPLICATIONS:

Write or call:

Adult Education

Advanced Digital Systems

Mohawk, New York 13407

(315) 866-6420

All applications must be received 45 days in advance. Class sizes limited.

## COMPUTERWORLD

# Memorex Loses \$8.97 Million in '74

SANTA CLARA, Calif. - Despite 1974 revenues of \$217.6 million, a 23% ahead of 1973, Memorex reported a year-end loss of \$8.97 million or \$2.00 a share, compared with a positive cash flow from operations for the first year in the company's history.

The company attributed the loss to the weakness of the dollar, as well as fourth-quarter changes in reporting gains and losses on translation of foreign currency indebtedness.

The positive cash flow was accomplished despite net repayments during the last nine months of 1974 of \$11.5 million of senior debt, investments required to support the volume increase of more than \$40 million, operating losses and continued investments made to support future growth, the company said.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1974 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million or \$2.73 a share.

The 1973 revenues totaled \$176.92 million with a loss of \$11.9 million

## Earnings Reports

### ELectRONIC DATA SYSTEMS

Three Months Ended Dec. 31  
 1974 1973  
 Shr End 1,304,000 1,212,000  
 Revenue 30,324,000 28,112,000  
 Earnings 3,522,000 4,221,000  
 Net Inv. 1,000  
 Revenue 60,775,000 57,898,000  
 Earnings 6,123,000

### BUNKER RAMO

Year Ended Dec. 31  
 1974 1973  
 Shr End 1,740 1,740  
 Revenue 314,017,000 290,624,000  
 Earnings 6,905,000 4,013,000  
 Net Inv. 1,000  
 Revenue 75,301,000 74,637,000  
 Earnings 3,383,000 2,918,000

### ANDERSON JACOBSON

Three Months Ended Dec. 31  
 1974 1973  
 Shr End 1,740 1,740  
 Revenue 3,585,892 2,126,650  
 Earnings 1,761,712 123,374  
 Net Inv. 1,000  
 Revenue 9,431,163 6,103,586  
 Earnings 4,782,261 323,431

### MILGO ELECTRONICS

Three Months Ended Dec. 31  
 1974 1973  
 Shr End 8,710 8,466  
 Revenue 9,974,000 6,985,000  
 Earnings 1,176,000 756,000

### COMPUTER SYSTEMS

----- Software & EDp Services  
 Peripherals & Subsystems ----- Leasing Companies  
 Supplies & Accessories ----- CW Composite Index

### COMPUTER SYSTEMS

----- SYNTAC  
 Nine Months Ended Dec. 31  
 1974 1973  
 Shr End 5,145,000 3,962,000  
 Revenue 584,165 499,818

### CONTROL DATA

Year Ended Dec. 31  
 1974 1973  
 Shr End 8,113 (000)  
 Revenue 1,101,262 948,150  
 Spec Cred 734 542  
 Sales Inv. 3,725 664  
 3 Mo Shr .93  
 Revenue 283,164 277,928  
 Spec Cred 544 525  
 Earnings (16,005) 15,238

### DATRONIC RENTAL

Three Months Ended Dec. 31  
 1974 1973  
 Shr End 1,128 9,740  
 Revenue 8,902,215 1,146,542  
 Earnings (33,777) .01  
 6 Mo Shr .01  
 Revenue 2,026,720 2,372,577  
 Earnings 6,006 92,935

\*-Restated.

### ITEL

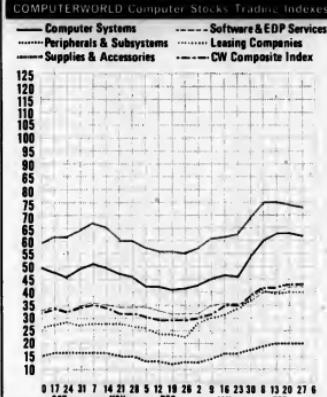
Year Ended Dec. 31  
 1974 1973  
 Shr End 14,350,000 500,000  
 Revenue 315,000,000 224,264,000  
 Div Inv. ----- 2,100,000  
 Tax Cred 9,700,000 5,900,000

### NATIONAL COMPUTER

Year Ended Dec. 31  
 1974 1973  
 Shr End 5,646 52,55  
 Revenue 315,000,000 224,264,000  
 Earnings 12,371,000 11,550,000  
 Net Inv. 2,795,000 3,111,000  
 Revenue 77,648,000 62,223,000  
 Earnings 2,795,000 3,111,000

\*-Restated. Life accounting method for the first nine months.

\*\*-Restated. Life accounting method for certain inventories for the first nine months.



## Computerworld Sales Offices

### Vice President - Marketing

#### Neal Wilder

#### Sales Administrator: Dottie Travis

#### Computerworld West

#### 797 Washington Street

#### Newton, Mass. 02160

#### Phone: (617) 965-5800

#### Telex: USA-92-2529

#### Northern Regional Manager

#### John Ziegler

#### Account Manager

#### Mike Burman

#### Computerworld

#### 797 Washington Street

#### Newton, Mass. 02160

#### Phone: (617) 965-5800

#### Telex: USA-92-2529

#### Eastern Regional Manager

#### Donald E. Fagan

#### Account Manager

#### Frank Gallo

#### Computerworld

#### 2125 Center Avenue

#### Fort Lee, N.J. 07024

#### Phone: (201) 461-2575

#### Los Angeles Area:

#### Bob Byrne

#### Robert Byrne & Assoc.

#### 1541 Westwood Blvd.

#### Los Angeles, Calif. 90024

#### Phone: (213) 477-4208

### San Francisco Area:

#### Bill Healey

#### Thompson/Haley Assoc.

#### 1111 Hearst Blvd.

#### San Francisco, Calif. 94103

#### Phone: (415) 362-8547

#### Japan:

#### Ken Suzuki

#### General Manager

#### Darpa/Computerworld

#### 111-15 Naka-cho, Gotanda

#### Shinagawa-ku, Tokyo 141

#### Phone: (03) 445-6101

#### Telex: Japan-26792

#### United Kingdom:

#### Mike Young

#### c/o IDC Europa Ltd.

#### 140-146 Camden Street

#### London NW1 9PF, England

#### Phone: (01) 485-2248

#### Telex: UK-2647-37

#### West Germany:

#### Olmar Weber

#### Computerworld GmbH

#### (8) Muenchen 90

#### Tegeler Landstrasse 300

#### West Germany

#### Phone: (089) 690-70-52

#### Telex: W.Ger-52-81-08

All statistics compiled,  
computed and furnished by  
TRADE+QUOTES, INC.  
Cambridge, Mass. 02139

## Computerworld Stock Trading Summary

CLOSING PRICES THURSDAY, FEBRUARY 27, 1975

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### LEASING COMPANIES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### COMPUTER SYSTEMS

1974 CLOSE REFL. WEEK  
 1975 CLOSE FEB. 27 CHG. CHG.  
 1/11 1/11 1/11 1/11

### PERIPHERALS & SERVICES

# Better look this gift horse in the mouth!

It will  
increase your  
CPU processing  
costs 27%



SDI has just completed an evaluation and benchmark of POWER/VIS. Some startling facts have been uncovered and should be called to your attention!

#### Send For Your Free SDI POWER/VIS Evaluation Report.

Send the coupon and we will return a complete copy of the report. It details how and why GRASPVIS outperforms POWER/VIS by an average of 27% in CPU processing and an amazing 11% in printing under identical benchmark conditions.

**You'll Thank Us For The Memory!**  
The report proves that POWER/VIS can demand far more real storage than GRASPVIS when performing comparable functions.

**Would You Write A Spooling System In COBOL?**  
Then why did IBM write POWER/VIS in PL/S?

Get the full picture before  
that gift horse takes you  
for a ride!

Please send me a free copy  
of the POWER/VIS evaluation.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_  
CPU Model \_\_\_\_\_ Memory Size \_\_\_\_\_ K.

# SDI

Creators of GRASP,  
EPAT, FMAINT & GRASPVIS  
880 Mitten Road  
Burlingame, California  
94010